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FATTENING STEERS OF THE VARIOUS MARKET GRADES.

By HERBERT W. MUMFORD

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Summary of Bulletin No. 90.

Object.—To determine the relative rapidity, extent, nature, and cost of gains with the six grades of feeding cattle, viz., fancy selected, choice, good, medium, common, and inferior. Page 157

Plan.—Sixteen steers of each grade were fed alike from November 29, 1902, to May 27, 1903, a period of 179 days. Four pigs followed each of the six lots of steers. The feeds used were cracked corn, corn and cob meal, cotton seed meal, old process linseed oil meal, clover hay, alfalfa, timothy hay, and corn stover. Page 158

Rapidity of Gains.—Average daily gain per steer in pounds: Fancy, 2.57; choice, 2.54; good, 2.34; medium, 2.13; common, 2.21; inferior, 1.96. Total gain in pork in pounds for each lot: Fancy, 419; choice, 500; good, 475; medium, 520; common, 420; inferior, 480. Page 168

Economy of Gains.—Average digestible dry matter in pounds required for producing a pound of gain in beef: Fancy, 9.95; choice, 12.09; good, 12.08; medium, 13.05; common, 12.00; inferior, 12.93. Number of pounds gain per bushel of corn consumed: Fancy, 9.74; choice, 7.97; good, 7.99; medium, 7.45; common, 8.13; inferior, 7.61. Page 170

Cost of Gains per Pound, Average.—Fancy, $0.067; choice, $0.082; good, $0.082; medium, $0.088; common, $0.081; inferior, $0.087. Page 170

Nature of Gains.—As a result of feeding the 16 *fancy* feeders (lot 1) until finished there was only one steer that would not grade as prime. This steer lacked slightly in quality, but principally in condition, and graded as choice. After slaughtering, the beef experts in Armour & Company's city beef department graded all the carcasses as No. 1. Page 180

Of the 16 *choice* feeders (lot 2) fourteen finished as prime, one as choice, and one as good. All the carcasses graded as No. 1 beef.

Of the 16 *good* feeders (lot 3) three finished as prime, five as choice, and eight as good. All the carcasses graded as No. 1.

Of the 16 *medium* feeders (lot 4) one finished as choice, four as good, eight as medium, and three as common. Four of the carcasses in this lot graded as No. 1 light and the remainder as No. 2 tops.

Of the 16 *common* feeders (lot 5) five finished the test as good, six as medium, and five as common beeves. The grading of the beef was the same as that in lot 4, namely, four carcasses graded as No. 1 light, and twelve as No. 2 tops.

Of the 16 *inferior* feeders (lot 6) four finished as good, six as medium, and six as common. Six carcasses graded as No. 1 light, nine as No. 2 tops, and one as No. 3 beef.

Percentages of Dressed Beef.—Average percentage carcass to live weight: Fancy, 61.62; choice, 61.52; good, 60.74; medium, 59.70; common, 59.88; inferior, 59.36. Page 178

Profit and Loss.—Market value as feeders November 29, 1902: Fancy, $4.75; choice, $4.55; good, $4.20; medium, $3.85; common, $3.60; inferior, $3.35 per hundred weight. Page 185

Market Value of Finished Cattle on Basis of Steady Market from November 29, 1902, to May 28, 1903.—Fancy, $7.00; choice, $6.90; good, $6.50; medium, $5.80; common, $5 50; inferior, $5.40. Page 190

Profit per Steer on Basis of Steady or Stationary Market.—Fancy, $18.15; choice, $15.67; good, $11.56; medium, $4.41; common, $4.09; inferior, $5.48. Page 191

Actual Selling Prices per cwt. when Marketed May 28, 1903, "Falling Market."—Fancy, $5.40; choice, $5.40; good, $5.15; medium, $4.90; common, $4.80; inferior, $4.80. Page 190

Loss per Steer on Basis of Actual or Falling Market.—Fancy, $3.80; choice, $7.44; good, $7.36; medium, $7.95; common, $5.26; inferior, $2.37 Page 191

Decline in Market from Beginning to Close of Experiment.—Fancy, $1.60; choice, $1.50; good, $1.35; medium, $0.90; common, $0.70; inferior, $0.60 per hundred weight. Page 194

Conclusions **Page 201**

FATTENING STEERS OF THE VARIOUS MARKET GRADES.

By HERBERT W. MUMFORD, Chief in Animal Husbandry.

Introduction.

In Bulletin No. 78 issued by this Station about a year ago, the writer illustrated and described the various market classes and grades of cattle as seen at our leading live stock markets. The two market classes receiving the greatest share of attention were beef cattle of the prime, choice, good, medium, and common rough grades; and feeders of the fancy selected, choice, good, medium, common, and inferior grades. Each grade of the fat cattle class was considered in all its relations to other grades of the same class, while each grade of feeders was described by comparing it with a standard grade of feeding cattle whose points of excellence were most uniform and characteristic. Thus it will be seen on the one hand that no attempt was made to indicate from what grades of feeders, prime, choice, good, or other grades of steers are developed or on the other how inferior, common, medium, good, choice, and fancy selected feeding cattle may be expected to feed out or finish in the feed lot. In a general way, men who make a business of buying and finishing feeders, handle largely one grade of cattle. They determine approximately their grade when sold by knowing how close to the top of the market they sell.

It is believed that all who finish cattle, either of their own breeding or those purchased as feeders in the market, will become more intelligent producers if they become more familiar with the possibilities of the various grades of feeding cattle. There is much of pecuniary value to the cattle feeder in knowing the correlation between the various grades of feeding cattle and the several grades of fat cattle.

Never did the results of an experiment in cattle feeding require more careful study and more serious thought than those to be presented in this bulletin. The reader is cautioned not to read parts of the bulletin and draw hasty conclusions, but to read and re-read all of it carefully and thoughtfully. An effort has been made to present the facts in such a manner as to avoid the possibility of the forming of misleading conclusions.

Object of the Experiment.

The object of this experiment was to secure data for the accurate comparison of the six standard grades of feeding steers with respect to the following points:

1. The extent or quantity of gains.
2. The rapidity of gains.
3. The economy of gains as measured by feed consumed.

4. The nature of the gain as indicated by the different grades during the feeding period and as measured by their re-grading as beef or fat cattle at the end of the experiment, the percentages of dressed beef and the percentages of fat.

5. The comparative quality of the beef as expressed by the grading of the carcasses after slaughter.

6. The relative profit to the feeder after considering all elements of outgo and income,—that is, the initial cost of the various grades of feeders, their relative extent and quality of gain, the cost of feed, and the comparative selling price of the various grades as marketed,—first under normal conditions, that is, a steady market; second, under abnormal conditions, that is, a falling market.

In the interest of brevity these various points will be alluded to throughout the text as the "extent," "rapidity," "nature," "economy," and "cost" of gain, and the "profit" or the "loss" in feeding.

TABLE 1.—GRADES OF FEEDING CATTLE, BEEF OR FAT CATTLE, AND CARCASSES ON CHICAGO MARKET.

Feeding Cattle	Beef or Fat Cattle	Carcasses
Fancy	Prime	No. 1
Choice	Choice	No. 1 Light
Good	Good	No. 2 Tops
Medium	Medium	No. 2
Common	Common Rough	No. 3
Inferior		Canning Stock

The practical feeder very much desires to know the relative economy of production with these six different grades of feeders, and also the grade of finished cattle that may confidently be expected from each in order that he may calculate which will be most profitable after considering the greater initial cost and the relatively higher selling price of the better grades. It was to answer these questions that this experiment was undertaken.

PLAN OF THE EXPERIMENT.

The animals used were sixteen steers of each of the various grades of feeding cattle which were placed in feed lots and fed under uniform conditions; therefore this experiment involved the feeding of six car-loads of cattle. The fancy selected, the choice, the good, the medium, the common, and the inferior grades, as described in Bulletin No. 78 of this Station were each represented.

Experiments have been conducted with a few animals which have thrown some light on this subject, but never before have enough animals been used to eliminate individuality and thus make it safe to accept the conclusions reached without a certain amount of reserve.

The choice, good, medium, common, and inferior feeders used in this

experiment were purchased in the Union Stock Yards, Chicago, the fancy selected in Missouri. These were all strictly grass cattle as none had received grain while on grass. They were purchased in October, and shipped to the University farm where they were all turned together on pasture, remaining there without grain for about a month. This placed all the cattle to be used in the experiment under uniform conditions for a month and furnished us an opportunity to become more familiar with the individuality of the steers. They were taken from the pastures and confined in the feed lots about the middle of November, when they were gradually accustomed to a light ration of broken corn together with all the hay they would eat. During the last week in November the various grades were selected without attempting to place them strictly in the grades for which they were originally bought. When the steers were purchased, sixteen or more of each grade were selected. A few of the steers changed sufficiently within the month intervening between purchasing and placing in the feed lot to change slightly their grade. In the main, however, they were ultimately assigned to those grades which they were bought to represent. A systematic effort was made to secure native cattle in all the grades for this test. It was found, however, that the offerings at the Yards, while large, were still not sufficient to fill accurately the various grades without taking an occasional range steer. The few range steers that were selected were practically as useful for the object of the test as were the natives, since they were quiet and had apparently been previously accustomed to grain feeding during the preceding winter.

At the beginning of the experiment the cattle were examined by a committee of experts from the Chicago Stock Yards, consisting of Mr. John T. Alexander, of Alexander, Ward and Conover; Mr. George W. Shannon, of Shannon Brothers, and Mr. James Brown, expert cattle buyer for Armour & Co., whose judgment was asked with reference to the grading and the market value of each grade. The same committee visited the Experiment Station at intervals of one month for the purpose of determining the improvement of each grade in value per hundred pounds. The author desires to acknowledge his indebtedness to these gentlemen for their faithful and efficient services. Their expert judgment has been of the greatest value and importance to this experiment.

The market at the beginning of the experiment was fixed upon as the basis for all values assigned to the cattle. This was done in order to free the valuations from fluctuations in the market, thus making it possible to secure data on basis of a steady market. This committee continued their work up to and including the time of marketing. As the cattle were weighed every two weeks and as a careful record was kept of the rations fed, it is possible to determine at what time the various loads could have been marketed to best advantage.

It is advisable to give a brief description of the cattle in each grade at the beginning of the experiment. For convenience the various grades were given lot numbers as follows:

Lot 1. Fancy selected feeders.
Lot 2. Choice feeders.
Lot 3. Good feeders.
Lot 4. Medium feeders.
Lot 5. Common feeders.
Lot 6. Inferior feeders.

LOT 1. FANCY SELECTED.

It seemed impossible to find a car-load of fancy selected feeders on the Chicago market during October, 1902, hence it was necessary to look elsewhere for them. They were finally located on the farm of Wallace Estill of Missouri. It was difficult to secure sixteen cattle which would in every way meet the requirements of this grade. The feeding qualities of the cattle selected to represent this grade fully sustained judgment at the time they were purchased. They contained nearly one hundred percent of the blood of the improved beef breeds. The dams were high grade Shorthorn cows and the sire a registered Hereford. With one exception they bore the markings of the Hereford; this steer resembled his Shorthorn parentage as to markings and more so as to his conformation than did the other steers in this lot.

While there was a slight lack of uniformity in size in this load of steers, they possessed the quality and conformation that accompany the typical beef-bred steer. It is true that they were the youngest steers, as a lot, in the test, being about two years old at the time of marketing. It is also true that age, as well as quality, conformation, and condition, is characteristic of the various grades of feeding cattle. Usually when the better grades of feeding cattle are selected for feeding they are comparatively young. To make this point more clear it may be said that it would be impossible to secure a two-year-old inferior feeder, as inferior steers of this age would possess neither the weight nor the flesh demanded in the feeder class. In Bulletin No. 78 feeders were described as follows: "As a rule, we may classify as feeders, steers weighing 900 pounds or more that are eighteen months old or older, and that are fleshy enough so as not to render an extended period of low feeding necessary." Manifestly the slower maturing, lower grades will always be the older animals when feeding weights are attained.

The individual steers comprising this fancy grade possessed outstanding quality. They were the kind from which car-load show cattle are produced. Those who have attempted to collect such a group of cattle know how very scarce they are. Such feeding cattle are very seldom seen in any of our feeding-cattle markets, for when such a bunch is known to

be for sale it is usually eagerly sought, hence it is unnecessary to ship them to the market to find a buyer. While these steers had not received grain on grass, they were what would be termed "fleshy" feeders. See Plate 1.

LOT 2. CHOICE FEEDERS.

The steers in this group were unquestionably choice. They possessed large frames and perhaps averaged six months older than the fancy selected lot, though still younger than lots 4, 5, and 6. Owing to their more advanced age and the appearance of being more growthy, this load of steers was frequently selected by experienced feeders as the best calculated to produce the largest and most rapid gains of any in the test. They were the heaviest cattle entering the test and perhaps, everything considered, were carrying slightly more flesh than the others, although lots 1 and 2 were similar in this regard. These were purchased in the Union Stock Yards, Chicago, and were the best that had been seen on the market for a considerable time. They were high-grade Shorthorns, uniform as to size, color, and conformation. Fed to a finish, steers of such quality ought to produce prime steers of sufficient merit to sell at the top on any ordinary market. See Plate 3.

LOT 3. GOOD FEEDERS.

The quality and finish so manifest in the choice and fancy-selected lots were not so much in evidence in this group, although it was easy to see that beef blood still predominated. While these cattle possessed a strong infusion of beef blood, they did not meet the requirements of the ideal feeder in type or conformation. They were inclined to be upstanding, while some of the steers were rather plain in their rumps. They lacked that attractive uniformity that characterized lots 1 and 2. As to condition they were hardly as fleshy as the grades already described. It should not be gathered from what has been said that these were an undesirable lot of feeding cattle, for they were not. In fact, cattle of their quality are not at all plenty in the markets of our country, and can only be produced by the use of bulls of some of the beef breeds. See Plate 5.

LOT 4. MEDIUM FEEDERS.

Undoubtedly the most noticeable characteristic of this group was its lack of uniformity in color. This suggests their probable mixed breeding. The lack of uniformity is not by any means the main difference between this and the better grades. A closer study reveals a coarseness and angularity not at all characteristic of those of better quality. There is a plain, old style appearance about them that is very evident. The cattle appeared to be close to three years old. Experienced feeders would select now and again a steer from this lot that would be expected to make large gains, and occasionally one that would finish quite smooth,

but the majority would always remain rather coarse, rough, and paunchy. It should be said that this lot did not contain a steer that failed to show evidence of improved beef blood, although the predominating blood seemed to be native or unimproved, with occasionally a dash of the blood of some one of the dairy breeds. See Plate 7.

LOT 5. COMMON FEEDERS.

This group showed but a very small percentage of beef blood. Native and unimproved blood predominated. There was no uniformity in color and every steer showed a lack of both quality and conformation. The steers were rather coarse boned and large headed, and were plain throughout. They did not all have similar faults, but all were noticeably deficient in some particular. They were the kind that result from the somewhat common practice of indiscriminate breeding and the too common practice of breeding from inferior grade bulls. See Plate 9.

LOT 6. INFERIOR FEEDERS.

There are so many standards by which feeding cattle might be designated as inferior that it is well to be explicit in specifying the standard employed in the selection of the cattle comprising this group. It was not that they should be steers carrying a high percentage of dairy blood, although two or three steers in this group were undoubtedly strongly dairy bred. Nor was it that they should be beef-bred steers of faulty conformation and lacking in constitution. An effort was made to select cattle inferior in quality and conformation from the standpoint of beef breeding, that is, those possessing very little, if any, of the blood of any of the improved beef breeds. This was a more difficult task than would seem to those who have not attempted it. The majority of this group were selected from a consignment of Virginia grass cattle shipped to the Chicago market. They showed no evidences of beef blood and every evidence of being scrubs. As such they were plain cold-blooded creatures, not at all pleasing to look upon. See Plate 11.

In general, the basis of selection in all these lots was quality, or beef breeding. In each instance where the grade called for well-bred beef steers they were selected not only with regard to their breeding, but care was taken that they should possess the qualifications which should accompany well-bred steers. In no case were steers selected to fill any of the grades that showed evidence of being poor and unprofitable gainers, and all were required to show equal evidence of health and thrift.

By referring to Table 3 it will be seen that the initial weights of lots 1, 5, and 6 were nearly the same, although lot 1 was the lightest of the three. Lot 2 was considerably the heaviest, while lots 3 and 4 were very similar in weight. These differences in weight were, with the

exception of lot 2, characteristic of the different grades used in the test.

The fact that the steers in lot 2 were so much heavier than those in the other lots should not be passed without comment. It has been shown why it was impracticable to secure steers of uniform age to represent the different market grades of feeding cattle. This was done, however, as far as practicable. By referring to the table it will be seen that there was but little variation in the average weight of the steers in the various lots, except that those in lot 2 were considerably heavier than those of any other lot. In order that justice should be done to all grades, it seemed reasonable to secure more age in the choice than in the fancy lot. Differences in the ages of the different grades were inevitable, but by securing an intermediate age in lot 2 which was one of the better grades, the factor of age as affecting cost of gains was largely eliminated. In securing more age and the quality which characterizes choice feeders it seemed necessary, to meet the requirements of this test, to get steers of rather heavy weight. It was not possible to secure cattle of uniform weight to represent the various grades without sacrificing other and apparently more important factors. It should also be noted that the differences in weight at the end of the experiment are much less marked than they were at the beginning.

In selecting steers for feeding with a definite idea as to when they are to be ready for the market, the cattle feeder must needs give careful attention to age, condition, and weight. In this instance feeders were wanted that could be finished with thirty to sixty days light and preliminary feeding, and one hundred to one hundred and twenty days full feeding. This being true, strictly grass cattle were selected.

SHELTER, FEED LOTS, AND WATER SUPPLY.

The shelter provided for the various grades of steers used in this experiment consisted of a low shed open to the south, very similar to the open sheds in common use for cattle feeding in the corn belt. It could hardly be said that the feed lots were like those commonly seen in Illinois, as they were all paved with brick. It is impossible to get two feed lots in which conditions would be precisely the same without some provision for keeping the cattle out of the mud. As the feed lots were small, 36x48 feet, with a 12-foot shed running along the north side, making the total size 36x60 feet, paving with brick seemed the most practicable system. The lots were not paved under the sheds, where the ground was protected from all surface water. The sheds were kept well bedded, but no attempt was made to bed the pavement. The lots were frequently cleaned, and in wet weather the consistency of the manure on the pavement was such that it could have been handled more

advantageously had litter of some sort been freely mingled with it. The price of bedding at the time prohibited its use for this purpose. During the day the steers had access to fresh pure water stored in galvanized steel tanks into which it was drawn from the University plant. Late in the evening of each day during the coldest weather the water was all drawn from the tanks by means of a convenient device in the bottom of each and carried away in a tile provided for that purpose.

METHOD OF FEEDING STEERS.

It should be borne in mind that, notwithstanding what may be subsequently said concerning the method of feeding and the feeds used in connection with this test, the experiment was primarily to test the feeding quality of the various grades of feeding cattle, while the feeds used and the manner of feeding the same were incidental rather than material and were the same for all lots. It seemed desirable to eliminate the pork-producing factor in this experiment as far as practicable; hence, the grinding of the grain seemed necessary. Corn and cob meal has given such universal satisfaction for cattle feeding that the use of the corn in this form promised good results. In seeking a nitrogenous roughage to supplement corn it was found that the quality of clover hay was universally bad and that it was impossible to secure good clover hay in sufficient quantities to warrant its use throughout the experiment. While clover and timothy hay were used in considerable quantities during the earlier part of the test, as soon as alfalfa could be secured it was used as roughage. Many well known cattle feeders have expressed the opinion from time to time that the chaffing or cutting of roughage and mingling it with the grain would prove the best method for economizing food. Except in a very few instances this method of feeding has never been used in an extensive way. The results of this experiment indicate that it is by no means an impracticable method of feeding. The clover and timothy hay, and later the alfalfa, were run through an ordinary ensilage machine which cut the hay into bits about two inches in length. This cut or chopped hay was mixed with the grain in certain definite proportions, as will be shown subsequently. During the early part of the experiment, cotton seed meal, and during the latter part, oil meal, were fed to supplement the corn, and these concentrates were an ingredient of the mixed feed which was fed the steers twice a day at six to seven in the morning and at four to five o'clock in the afternoon. Great care was taken to see that each lot was fed at the same hours each day.

The adoption of this system of feeding made it possible to keep very accurate records of all feed, both roughage and concentrates and to insure that the proportion of roughage to concentrates was always the same with all the lots.

The experiment began November 29, 1902, and for several weeks the ear corn was simply run through an ensilage machine, which cracked the corn and cobs. The grinding of the corn, cob and all, began about the middle of February. Toward the last of the feeding of the cracked corn and cobs the steers left a large part of the cobs.

The advantage of this system of feeding shows the possibility of converting a large proportion of the feed consumed into beef, profit not being so largely dependent upon the hog as a factor in beef production. There were very few cases of scours during the feeding period, and only two out of the 96 head were off feed during the entire time. These facts will at once commend this system to experienced feeders. It was not necessary to take out a single steer originally selected for the experiment, and the cattle were peculiarly free from sickness of any kind.

The cotton seed and linseed meal were both of good quality; the former was the "Dixie Brand," the latter "Old Process," pea size. The clover hay used was of poor quality, the timothy hay, medium, the alfalfa while not strictly choice, was good, and the stover was poor.

The cattle having been fed on broken corn for about three weeks prior to the beginning of the experiment and for a few days after, did not at first take kindly to the change from broken to cracked corn. In less than a week, however, they ate the cracked corn greedily. The grain and hay were fed separately for three weeks, after which time the hay was cut and mixed with the grain. They ate the mixed feed well from the start. The feeding of cotton seed meal was begun the fifth week of the experiment. The cattle did not eat it well at the start. In less than two weeks, however, they ate it greedily. For the first six weeks the amounts of corn and hay fed were about equal. At the beginning of the seventh week the proportionate weight of hay to corn was as one to two. Corn stover was fed to each lot one or two days a week during January and February in order to furnish variety and add the extra roughage which the steers seemed to relish. The appetite was kept keen by increasing the feed slowly and gradually. No indications of leaving feed were seen until about the end of the eighth week, when there was some tendency to leave some of the roughage part of the ration. This was taken as an indication that the amount of roughage to the grain fed was too great. Consequently the proportion was reduced to three-quarters corn to one-quarter hay. February 8, one-half the roughage fed was clover hay and the other half alfalfa. From February 11 to the end of the experiment practically all of the roughage fed was alfalfa. It proved a most excellent roughage. The droppings of the steers soon began to show that their bowels were in much better condition than when clover hay of poor quality was fed. By February 18 the steers were getting all the feed they would take. From this time on an effort was made to feed them all they would eat, care being taken not to force

them off feed. Not a steer of the whole 96 head scoured until March 23, when one in lot 3 began scouring. In a very few days this was stopped, and no more cases occurred. March 24 one-half of the cotton seed meal was replaced by linseed oil meal. The cotton seed meal in the ration was gradually replaced by oil meal. Neither the appetites of the steers nor their droppings appeared to be materially different as a result of this change. Their appetite fell off materially with the warm days of May and they were given less feed in consequence.

On the basis of the total digestible nutrients fed throughout the experiment, the nutritive ratio is 1: 7.64. This is too wide as compared with the standard nutritive ratio for fattening steers, a variation from the standard which is permissible in the corn belt where the effort is to use as much corn as possible, and the gains made for food consumed appear to indicate that a ration having a nutritive ratio of 1: 7.64 made up of the feeds used in this experiment will produce satisfactory returns.

Table 2 shows the daily rations fed per 1,000 pounds live weight in each lot by periods. This exhibit is presented because it is believed that many cattle feeders will be interested in knowing just how much and what kind of grain and how much and what variety of roughage the steers received daily during the various stages of the fattening process.

By referring to the table it will be seen that during the first month the number of pounds of roughage to grain or concentrates fed per thousand pound steer was as 4:3. From this time on the grain part of the ration was gradually increased while the roughage was as gradually decreased until the last, when about five times as much grain was fed as roughage.

Some timothy hay was fed, but for no other reason than that clover was not available at the time. The change from cotton seed to old process linseed meal was made to furnish greater variety.

Of the total feed consumed, a little less than 69 percent was grain and a little more than 31 percent was roughage; that is to say, the weight of roughage was 45 percent of that of the grain. As the same ration was fed to all there was no opportunity of knowing whether a different proportion would have been more favorable for certain of the grades.

TABLE 2.—DAILY RATION PER THOUSAND POUNDS LIVE WEIGHT BY PERIODS.

Lot	Food stuffs.	*Periods.						
		1	2	3	4	5	6	7
1	Cracked corn, and corn and cob meal.	8.75	13.38	19.19	17.63	16.91	16.74	17.12
	Cotton seed meal	....	1.54	2.71	2.30	.98	....	....
	O. P. linseed meal	....	....	....	....	1.23	2.34	2.39
	Alfalfa	....	....	2.96	5.88	5.04	4.45	3.48
	Clover hay	9.05	2.45	5.19	....	....	....	.20
	Timothy hay	3.98	8.24	....	....	....	....	.30
	Corn stover	....	2.50	1.10	....	....	....	....
2	Cracked corn and corn and cob meal	8.63	13.38	19.35	18.54	18.98	18.27	17.99
	Cotton seed meal	....	1.45	2.74	2.42	1.12	....	....
	O. P. linseed meal	....	....	....	....	1.41	2.56	2.52
	Alfalfa	....	....	2.94	6.18	5.75	4.85	3.65
	Clover hay	8.91	2.36	5.25	....	....	....	.21
	Timothy hay	4.22	7.95	....	....	....	....	.30
	Corn stover	....	2.13	.96	....	....	....	....
3	Cracked corn and corn and cob meal	9.43	13.90	19.35	18.58	19.10	18.11	17.89
	Cotton seed meal	....	1.51	2.75	2.43	1.08	....	....
	O. P. linseed meal	....	....	....	....	1.41	2.54	2.50
	Alfalfa	....	....	2.96	6.20	5.67	4.81	3.56
	Clover hay	10.12	2.46	5.20	....	....	....	.21
	Timothy hay	3.88	8.40	....	....	....	....	.31
	Corn stover	....	2.35	1.05	....	....	....	....
4	Cracked corn and corn and cob meal	8.76	13.72	19.53	18.86	19.02	17.90	17.08
	Cotton seed meal	....	1.52	2.80	2.47	1.10	....	....
	O. P. linseed meal	....	....	....	....	1.39	2.51	2.39
	Alfalfa	....	....	2.97	6.29	5.55	4.76	3.46
	Clover hay	10.18	2.51	5.31	....	....	....	.20
	Timothy hay	3.89	8.36	....	....	....	....	.29
	Corn stover	....	2.37	1.07	....	....	....	....
5	Cracked corn and corn and cob meal	9.01	13.81	19.50	18.35	18.37	17.11	17.60
	Cotton seed meal	....	1.54	2.77	2.40	1.05	....	....
	O. P. linseed meal	....	....	....	....	1.35	2.38	2.46
	Alfalfa	....	....	2.95	6.12	5.46	4.54	3.57
	Clover hay	10.90	2.51	5.26	....	....	....	.20
	Timothy hay	4.03	8.48	....	....	....	....	.30
	Corn stover	....	2.50	1.13	....	....	....	....
6	Cracked corn and corn and cob meal	7.93	13.26	19.48	17.74	17.30	16.92	16.27
	Cotton seed meal	....	1.52	2.71	2.32	.98	....	....
	O. P. linseed meal	....	....	....	....	1.28	2.37	2.27
	Alfalfa	....	....	2.94	5.91	5.14	4.50	3.29
	Clover hay	10.15	2.45	5.37	....	....	....	.19
	Timothy hay	4.63	8.23	....	....	....	....	.28
	Corn stover	....	2.47	1.12	....	....	....	....

*Period 1 extended from November 29 to December 27, 1902; period 2, December 27, 1902, to January 24, 1903; period 3, January 24 to February 21; period 4, February 21 to March 21; period 5, March 21 to April 18; period 6, April 18 to May 16; period 7, May 16 to May 28.

TABLE 3.—EXTENT AND RAPIDITY OF GAINS IN POUNDS FOR THE VARIOUS GRADES.

Lot No.	Market grade at beginning of experiment.	16 steers at beginning of experiment.	Average per steer.	16 steers at end of experiment.	Average per steer.	Average gain per steer for whole period.	Average daily gain per steer for 179 days.
1	Fancy	14953	934.562	22315	1394.687	460.125	2.570
2	Choice	17836	1114.750	25120	1570.000	455.250	2.543
3	Good	16305	1019.062	23010	1438.125	419.062	2.341
4	Medium...	16355	1022.187	22450	1403.125	380.938	2.128
5	Common ..	15458	966.125	21780	1361.250	395.125	2.207
6	Inferior ...	15448	965.500	21055	1315.937	350.437	1.957

This table exhibits the total weight of each lot, and the average weight of each steer at the beginning and at the end of the experiment, the average gain of each steer in each lot for the whole period, and the average daily gain per steer in each lot throughout the feeding period.

Undoubtedly, the most characteristic thing illustrated in this table is the variation in the extent and rapidity of gains made by the steers in the various lots. With one exception it will be seen that the better the grade of steers the greater and the more rapid the gains. This exception is lot 4. The steers in lot 4 did not gain quite as rapidly as did those in lot 5 which were lower in grade. This variation in extent and rapidity of gains is so gradual and regular that it is added proof of the generally accepted fact that, where other conditions remain constant, the better the quality of steers the greater and the more rapid are the gains. That there should be such wide differences in gains as is shown in the above table adds further evidence on this point. The economic importance of this factor will receive comment later.

Larger gains are frequently reported, especially in short feeding periods, but at no time during the first half of the feeding period were these steers crowded to their utmost capacity. During the last half only were they given all that, in the judgment of those having the experiment in charge, they could use to advantage. Attention was given to economical rather than extensive production of beef. Economical production of beef involves the securing of a satisfactory market finish without overloading the animal with fat. While an over-ripe condition contributes largely to higher averages of dressed beef and higher percentages of fat, it is detrimental to the retail butcher, the consumer, and the producer; to the retail butcher because it entails too much waste of fat in cutting; to the consumer because he is forced to accept more fat at the market than can be agreeably consumed along with the lean beef accompanying the cut; and lastly, and most important of all from the feeders' standpoint, this unnecessary and superfluous fatness of the over-ripe bullock is the best possible evidence that the last gains have been very expensive.

TABLE 4.—AVERAGE DAILY GAIN PER STEER IN POUNDS FOR EACH LOT BY PERIODS AND AVERAGE FOR ALL LOTS BY PERIODS.

Lot No.	From Nov. 29–Dec. 27, 1902. 28 days.	From Dec. 27, 1902–Jan. 24, 1903. 28 days.	From Jan. 24–Feb. 21, 1903. 28 days.	From Feb. 21–Mar. 21, 1903. 28 days.	From Mar. 21–Apr. 18, 1903. 28 days.	From Apr. 18–May 16, 1903. 28 days.	From May 16–May 28, 1903. 12 days.	From Nov. 29, 1902–May 29, 1903. 179 days.
1	2.136	.959	3.024	2.812	2.968	3.303	3.125	2.570
2	2.095	.825	2.801	2.734	3.683	3.203	2.329	2.543
3	1.428	.904	2.555	2.500	3.448	2.801	3.380	2.341
4	1.484	.457	2.154	2.734	3.191	2.399	3.011	2.128
5	1.466	.424	2.232	2.714	3.538	2.544	3.039	2.207
6	1.466	.982	1.852	2.198	3.493	2.008	1.307	1.957
Average	1.679	.759	2.436	2.615	3.387	2.710	2.698	2.291

The accompanying Table 4 shows that the greatest average daily gain for the ninety-six head came during the four-week period from March 21 to April 18, and the lowest average daily gain was secured during the second four-week period. Barring the one exception of the second four weeks in the feeding period, taking the whole number of steers involved in this test, the average daily gains increased steadily from the first four-week period to that of the fifth period, after which the average daily gains fell off slightly for the last two periods, but the gains here were still greater than those obtained during any of the periods preceding period five. Tabulated records on subsequent pages of this Bulletin, Table 14, show that the committee of experts from the Yards, consisting of Messrs. Alexander, Shannon, and Brown, decided, without knowing the gains made by the cattle month by month, that during this same fifth period the steers increased in value more than during any other four-week period. This is evidence of the expert ability of these gentlemen and of the great care that was exercised in fixing the values of the cattle from month to month.

The results tabulated have a bearing upon the possible extent of gains in the various grades under study. By referring to Table 4 it will be seen that the average daily gains for the last forty days of the experiment were rather above than below the average for the whole time, an increase which indicates that probably fairly satisfactory gains could have been secured for a limited longer period. It is more than probable, however, that the increase in value per hundred weight of the steers of the various lots would not have been sufficient to render such feeding profitable. As bearing upon this important question we publish the following statement made by the committee of experts, Messrs. Alexander, Shannon, and Brown:

EXCHANGE BUILDING, UNION STOCK YARDS.
CHICAGO, ILL., September 10, 1903.

All of the various lots, from one to six, inclusive, of the steers mar-

keted by the Illinois Experiment Station, May 28th, 1903, were in good marketable condition. Their market value would not have been profitably enhanced by further feeding.

Signed, { JOHN T. ALEXANDER, GEORGE W. SHANNON, JAMES BROWN, *Committee of Experts.*

TABLE 5.—ECONOMY OF GAINS AS MEASURED BY FEED CONSUMED. DIGESTIBLE *DRY MATTER REQUIRED FOR PRODUCING GAINS IN BEEF, COST OF POUND OF BEEF.

Lot No.	Total in concentrates.	Total in roughage.	Total dry matter.	Total gain, pounds.	Dry matter per pound of gain.	†Total cost of gain.	Cost per pound of gain.
1	50753.966	22513.674	73267.640	7362	9.952	$496.45	$0.0674
2	61393.255	26699.992	88093.247	7284	12.094	598.59	.0821
3	56236.152	24781.074	81017.226	6705	12.083	548.18	.0817
4	54977.196	24558.566	79535.762	6095	13.049	534.63	.0877
5	52179.942	23695.316	75875.258	6322	12.002	513.47	.0812
6	49512.307	22982.623	72494.930	5607	12.929	485.64	.0866
Total	325052.818	145231.245	470284.063	39375	11.943	3176.96	.0806

*Dry Matter. The portion of a feeding stuff remaining after the water or moisture contained therein has been driven off by heat. Ordinary feeds contain about 10 to 11 percent moisture.

†The figures in this column represent the total cost of feed less value of pork produced by the pigs following the various lots.

Table 5 exhibits not only the total number pounds digestible dry matter fed each lot, but the amount of dry matter in the roughage and in the concentrates separately. It shows the pounds dry matter required to produce a pound of gain in beef for each lot, the cost of gain, and the cost per pound of gain in each lot.

From the totals in this table it was determined that about 69.11 percent, or a little more than two-thirds of the digestible dry matter fed, was fed in the form of concentrates, such as corn and cob, cotton seed and oil meal, and 30.89 percent was fed in form of roughages, such as clover, timothy, alfalfa hay, and corn stover. It will be noticed that except in the case of lot 1 the total amount of dry matter consumed varies directly with the grade of steers. The better the grade, or the better bred the steers, the larger the consumption of dry matter. The consumption of dry matter did not follow as uniformly the variations in weight of the cattle. It did not necessarily follow that because one lot of steers was heavier than another it would consume more feed and consequently more dry matter. Weight certainly does have a marked influence upon capacity and demand for feed, but the records of this test appear to indicate that the possibility of large consumption is also dependent upon the grade or quality of the cattle. In case of lot

1, however, there appears to be a relatively small consumption of dry matter. This is the lot in which the weight of the cattle at the beginning of the experiment was much less than in other lots, and this undoubtedly was the cause of the smaller consumption of feed.

By referring to the column in the table showing the pounds dry matter required to produce a pound of gain in beef, it can be seen that while the average number of pounds of dry matter required to produce a pound of gain in beef for the whole 96 head involved in the experiment was 11.943 pounds, the steers in lot 1 required only 9.952 pounds. This shows that the steers in lot 1 were clearly the most economical producers of beef of all the lots. The gains in beef in lot 4 were made at greatest expense of dry matter consumed, while lot 6 is a close second. That there should be so much difference in the cost of a pound of beef between lot 1 and the other lots and that there should be such slight differences in the other grades should not be passed unnoticed. The cost of gains in the various lots does not seem to be clearly dependent upon either the age, initial weight, or breeding of the steers. In lot 1 we have the highest percentage of beef blood, the youngest age, and the least initial bodily weight. It is believed that all of these factors contributed to the results exhibited here. Evidence is wanting, however, to make it possible to make strong claims for any one of these factors as an essential above all things in the economic production of beef.

Cost of gains in beef were computed both on the basis of digestible dry matter consumed and net cost of food converted into beef. This will make it possible for the feeder to tell at a glance the relative cost of gains in beef in the various lots under conditions prevailing during the past season. Market prices of feeds used in beef production are subject to great variations, hence, the dry matter table is believed to be essential.

NUMBER OF POUNDS BEEF PRODUCED PER BUSHEL OF CORN FED.

Since it is customary among feeders to use a bushel of corn as the unit for figuring the possibility of securing certain gains from a given amount of feed, the subjoined statement will be of interest.

The steers in lot 1 made 9.74; lot 2, 7.97; lot 3, 7.99; lot 4, 7.45; lot 5, 8.13; and lot 6, 7.61 pounds of beef for each bushel of corn consumed.

It should be borne in mind that with each bushel of corn about eight pounds of some highly nitrogenous concentrate like cotton seed or linseed oil meal was fed, and that in addition to beef a certain amount of pork was produced.

TABLE 6.—NUMBER OF POUNDS DIGESTIBLE DRY MATTER REQUIRED TO PRODUCE A POUND OF GAIN FOR EACH PERIOD, ALSO FROM BEGINNING OF EXPERIMENT TO END OF EACH PERIOD.

Lot No.	Nov. 29–Dec. 27, 1902.	Dec. 27, 1902–Jan. 24, 1903.	Nov. 29, 1902–Jan. 24, 1903.	Jan. 24–Feb. 21, 1903.	Nov. 29, 1902–Feb. 21, 1903.	Feb. 21–Mar. 21, 1903.	Nov. 29, 1902–Mar. 21, 1903.	Mar. 21–Apr. 18, 1903.	Nov. 29, 1902–Apr. 18, 1903.	Apr. 18–May 16, 1903.	Nov. 29, 1902–May 16, 1903.	May 16–May 28, 1903.	Nov. 29, 1902–May 28, 1903.
1	8.60	24.815	13.630	9.654	11.669	9.464	10.472	8.408	10.024	8.408	10.024	9.058	9.952
2	10.342	32.891	16.715	12.081	14.447	11.678	13.552	9.354	12.278	10.740	11.957	14.385	12.094
3	14.733	28.557	20.091	12.021	15.872	11.611	14.490	9.080	12.727	11.046	12.382	9.008	12.083
4	13 890	55.704	23.743	14.191	18.720	10.667	15.496	9.590	13.615	12.463	13.393	9.438	13.049
5	13.951	57.585	23.739	12.992	17.867	9.982	14.738	8.091	12.471	11.244	12.229	9.349	12.002
6	13.242	24.407	17.200	15.614	16.813	11.799	15.117	7.649	12.507	13.370	12.651	19.423	12.929
All lots combined	12.066	33.091	18.609	12.468	15.540	10.810	13.891	8.774	12.294	10.977	12.032	10.776	11.943

Important data are presented in Table 6. It shows the amount of digestible dry matter required to produce a pound of gain during each of the four-week periods throughout the experiment and the amount required from the beginning of the experiment to the end of each period. From this data some light is thrown upon the question whether or not early gains are cheapest after eliminating the first few weeks during which time apparent gains are to be partially referred to "fill." The very large amount of dry matter required to produce a pound of gain in all the lots from December 27, 1902, to January 24, 1903, should be noted. By referring to Table 4 it will be seen that the gains in all the lots during this period were much smaller than the gains for the corresponding lots during the periods preceding and following the one in question. The fact that the gains were light during the preceding period is evidence that the small gains during the second period were not due to differences in stomach and intestinal contents at the beginning and end of the period. As far as we are able to determine, the expenditure of relatively so large an amount of dry matter to produce such small gains was due to several causes.

First, the feed lots were undergoing important changes which necessitated the frequent disturbance of the steers by workmen.

Second, visitors were numerous and the steers were frequently disturbed on their account.

Third, feeds which the steers had not been accustomed to eating were added to the ration, and the preparation of feeds used and method of feeding were considerably modified.

It has been customary in reporting tests of efficiency of feeds for meat production to reduce the results to the amount of feed required for producing a unit of gain. Thus the gain produced is assumed as the constant quantity and the amount of feed required is calculated on that basis. The author believes, however, that in discussing the efficiency of a ration a fixed quantity of the ration itself is properly the basis of calculations, and that the comparisons made should be between the different gains produced by this fixed quantity of the feed under the various conditions of the test. In this way the producing capacity of the feed is shown in simple terms, while by the other method the gaining capacity of the animal is the result obtained. On this assumption the following table is presented, showing the amount of beef produced per bushel of corn consumed, and the amount and value of the beef produced per 1,000 pounds digestible dry matter when fed to each of the six grades of steers.

The efficiency of the feed for producing increase in weight is shown in line 3 of the table, and is computed from the increase in weight and the digestible dry matter consumed by each lot of steers. The efficiency

in the case of lot 1 is then made the unit or 100 percent, and the results reduced to this basis, as shown in line 4.

Next the efficiency of the feed for producing increase in value per hundred weight of the beef is recorded in lines 7 and 8. These figures are derived as follows: Assuming a stationary market throughout the experiment, the increase in value per hundred weight of the cattle—as fixed by the committee of experts—is divided by the amount of digestible dry matter consumed (lines 5 and 6), giving the increase in value of cattle per hundred weight per unit of feed. Reducing the results to terms of lot 1 as above, we have the eighth line of the table.

Lines 9 and 10 show the efficiency of the feed for producing percent increase in value of cattle per hundred weight, which result is obtained for each lot by dividing the increase in value per hundred weight for 1,000 pounds digestible dry matter by the original cost per hundred weight.

In order to determine the efficiency of the feed for increasing both amount and quality of beef—in other words, to find the total increase in value of the cattle due to a unit of feed consumed—the increase in live weight per unit of feed is multiplied by the increase in value per hundred weight per 1,000 pounds digestible dry matter consumed. In this way lines 11 and 12 are obtained.

Taking into consideration the percent increase in value per hundred weight of the cattle and their increase in weight, for 1,000 pounds digestible dry matter consumed, the net efficiency of the feed may be computed. This result is shown in lines 13 and 14, which are obtained by multiplying the results in line 2 by the corresponding numbers in line 9. We now have the efficiency of the feed with respect to increase in weight (line 4), increase in value per hundred weight (line 8), percent increase in value per hundred weight (line 10); increase in value (line 12); and percent increase in value combined with increase in weight (line 14).

It should be borne in mind that the data presented in the accompanying table are computed on the basis of a stationary market, the increases in value per hundred weight in the various grades being fixed by the committee of experts.

TABLE 7.

	Lot 1, Fancy.	Lot 2, Choice.	Lot 3, Good.	Lot 4, Medium.	Lot 5, Common.	Lot 6, Inferior.	Line.
Lb. beef produced per bu. corn consumed ...	9.74	7.97	7.99	7.45	8.13	7.61	(1)
Lb. beef produced per 1,000 lb. digestible dry matter consumed.....	100.40	82.60	82.70	76.60	83.30	77.30	(2)
Efficiency of feed for producing quantity of gain, or percent of digestible dry matter converted into beef ...	10.04	8.26	8.27	7.66	8.33	7.73	(3)
Efficiency of feed for quantity of gain on basis of 100 percent for lot 1.....	100	82	82	76	83	77	(4)
Increase in value of cattle per cwt.....	$2.25	$2.35	$2.30	$1.95	$1.90	$2.05	(5)
Total lb. digestible dry matter consumed	73,268	88,093	81,017	79,536	75,875	72,495	(6)
Increase in value of cattle per cwt. per 1,000 lb. of digestible dry matter consumed.....	$0.031	$0.027	$0.028	$0.025	$0.025	$0.028	(7)
Increase in value of cattle per cwt. per 1,000 lb. digestible dry matter consumed on basis of 100 for lot 1	100	87	90	81	81	90	(8)
Percent increase in value of cattle per cwt. per 1,000 lb. digestible matter consumed.....	.0065	.0059	.0066	.0065	.0069	.0083	(9)
Ditto on basis of 100 percent for lot 1.....	100	91	102	100	106	128	(10)
Increase in total value of cattle per 1,000 lb. digestible dry matter consumed	$3.11	$2.23	$2.32	$1.91	$2.08	$2.16	(11)
Ditto on basis of 100 for lot 1.....	100	72	75	61	67	69	(12)
Percent increase in value per hundred weight combined with increase in weight for 1000 lb. digestible dry matter consumed	.652	.487	.545	.497	.574	.541	(13)
Ditto on basis of 100 for lot 1.....	100	75	84	76	88	98	(14)

With respect to amount of gain produced the feed of lots 1, 2, 3, 4, 5, and 6 was effective or efficient in the ratio 100 82, 82, 76, 83, 77 respectively.

With respect to quality of the increase, or its increase in value per hundred weight, the ratio was 100, 87, 90, 81, 81, 90.

With respect to the percent increase in value per hundred weight the ratio was 100, 91, 102, 100, 106, 128.

With respect to combined quantity and quality of gains, or total increase in value of the cattle, the ratio was 100, 72, 75, 61, 67, 69.

With respect to percent increase in value per hundred weight combined with increase in weight the ratio was 100, 75, 84, 76, 88, 98.

It will be observed that the most economical disposition of the feed consumed was made by the fancy selected feeders, excepting as to their percent increase in value per hundred weight for feed consumed. As previously noted, these steers were younger, lighter, and of more uniform breeding than any of the other grades. Another notable fact is that the feed was clearly more efficient for increasing the value of the cattle in the three higher than in the three lower grades when both quantity and quality of gains are considered. The good showing made by the common and inferior cattle in respect to the percent increase in value per hundred weight for a given quantity of feed, and in respect to the percent increase in value per hundred weight combined with their increase in weight as indicated in lines 10 and 14, respectively, is due to their lower original cost and consequent advantage as to relative or percent increase in value. The efficiency of the feed as shown by the percent increase in value per hundred weight of cattle is a more variable factor than its efficiency as indicated by the actual gain in weight and its value per hundred weight, so that the result in line 12 can be accepted as a more constant and reliable comparison of the grades than can those of lines 10 and 14, because any market condition which changes cost, selling price, relative increase in value per hundred weight of the various grades would materially change the relative percent increase in value of the cattle. These results as a whole may be interpreted as pointing to a relatively more economical gain by the higher grades, and a widely variable relation between the various grades as to the percent of increase in actual value which they will produce from a given amount of feed. The feed was least efficient as to value per hundred weight of gains when fed to the medium and common grades, least efficient as to combined quantity and quality of gains when fed to the medium cattle; and least efficient as to percent increase in value per hundred weight combined with increase in weight in the case of the choice and medium grades.

GAINS IN WEIGHT OF PIGS FOLLOWING STEERS.

As has been stated elsewhere it was thought advisable to eliminate the pig as far as possible in this test. This end was reached by grinding the grain. Five pigs were placed with each lot of sixteen steers at the beginning of the experiment. As will be seen by referring to the following statement the steers received very light grain rations for the first two months and made correspondingly small increase in live weight. One of the pigs in lot 5 was accidentally killed and as no other pig was

available to substitute in its place it was thought best to reduce the number in each lot to correspond with that in lot 5. During the last month of the experiment eight pigs were allowed to follow the sixteen steers in lot 2. These eight pigs made nearly as great average individual gains as when only four were following the sixteen steers. From this we are led to believe that from the time the steers were worked up to full feed until the end of the experiment, the production of pork might have been nearly doubled. It should not be assumed that the large pork production of the pigs in lot 2 during the last month was due to the fact that the droppings had been allowed to accumulate for a long time as the pens were cleaned but shortly before the extra pigs were turned into them.

The gains in pork by lots for the whole period were as follows:

Lot 1.	419 pounds.	Lot 4.	520 pounds.
*Lot 2.	500 pounds.	Lot 5.	420 pounds.
Lot 3.	475 pounds.	Lot 6.	480 pounds.

It is quite remarkable that the smallest amount of pork produced should be in the lot where the steers took the least number of pounds of dry matter to produce a pound of beef, and that where pork production was greatest the feed was apparently least efficient for beef production. The relationship between the high efficiency of the feed for beef production and minimum pork production is too regular to escape comment. Referring to the table exhibiting the average number of pounds of dry matter to produce a pound of gain in beef (Table 5), it will be seen that for efficiency, the lots stand in the following order: 1, 5, 3, 2, 6, and 4, while for pork production, they have the following order, beginning with the lot showing smallest production of pork: 1, 5, 3, 6, 2, and 4.

The steers were loaded for shipment to Chicago on Wednesday afternoon May 27, care being taken to have each lot receive as nearly the same treatment as possible. The Champaign weight was taken on the morning of the 27th before the cattle had been fed or watered. They were then fed their regular feed of grain and roughage, except that the roughage fed on the morning of the 27th and that fed on the previous day was timothy hay instead of clover or alfalfa, which are liable to cause some bloating in transit. In case the roughage fed consists of clover or alfalfa bloating can usually be avoided by the feeding of timothy hay for the last day or two before shipment. The steers were also given free access to water between 9 and 10 A. M. after being grained.

*The actual amount of pork produced by the original four pigs following this lot of steers throughout the experiment, thus making it possible to compare the pork produced in this lot with that produced in all other lots.

TABLE 8.—NATURE OF GAINS. SHIPPING AND SLAUGHTER WEIGHTS OF STEERS.

	Lot 1.	Lot 2.	Lot 3.	Lot 4.	Lot 5.	Lot 6.
Weight 16 steers, Champaign, May 27, 1903. Pounds	22315.00	25120.00	23010.00	22450.00	21780.00	21055.00
Average weight per steer, Champaign. Pounds	1394.68	1570.00	1438.12	1403.12	1361.25	1315.93
Weight 16 steers, Chicago, May 28, 1903	21960.00	24650.00	22430.00	21980.00	21370.00	20940.00
Average weight per steer, Chicago. Pounds	1372.50	1540.62	1401.87	1373.75	1335.62	1308.75
Percentage of shrinkage in shipping	1.59	1.87	2.08	1.64	1.88	.54
Pounds shrinkage per steer	22.18	29.37	36.25	29.27	25.62	7.18
Total dressed weight of 16 carcasses	13532.00	15165.00	13622.00	13120.00	12797.00	12341.00
Average weight of 16 carcasses. Pounds	846.00	947.00	851.00	820.00	799.00	777.00
Percentage of carcass to live weight	61.62	61.52	60.74	59.70	59.88	59.36
Percentage of caul fat	3.39	3.50	3.59	3.77	3.61	3.83
Percentage of rough fat	6.07	6.18	6.98	6.98	6.46	7.98

Especial care was taken to bed the cars well with straw, and for convenience in keeping the lots separate only sixteen steers were put in a car. The yards and loading chutes at Champaign were located about a mile from the feed lots. In driving the cattle to the loading chutes and in loading them, great care was exercised to handle them quietly and without confusion, that they might arrive on the market with as little shrinkage as possible. The cattle were all loaded between three and six o'clock in the afternoon. They left Champaign at 7:30 P. M., May 27, and arrived in Chicago at 5:30 A. M., May 28.

By referring to the above table it will be seen that the shrinkage per steer was light with all the lots, but remarkably so with lot 6. The highest shrinkage was with lot 3. The light shrink of the steers in lot 6 is undoubtedly due to the fact that they "filled" better in the Yards than the steers in the other lots, especially much better than those in lot 3. No cause is known why lot 3 should "fill" the poorest and lot 6 the best. With the two exceptions noted, the percentages of shrinkage were quite uniform. The light shrinkage is attributed partly to the quiet handling in driving and loading, and partly to the feeding of timothy hay during the last two days. No attempt was made to handle the cattle in such

a way as to secure a "big fill" at the Union Stock Yards, as it was desirable that there should be nothing to interfere with the normal percentages of dressed beef in each lot and the normal relation existing between the percentages of dressed beef in the various lots.

In referring to the above table it may be said that the most striking fact brought out by it is that the percentages of dressed beef bear precisely the same relation to each other as do the gains in live weight. The steers in lot 1 gained the most, lot 2 came next, with lots 3, 5, 4, and 6 following in the order named. The steers in lot 1 dressed the highest, 61.62 percent, those in lot 2 came next, with lots 3, 5, 4 and 6 following in the order named.

These higher percentages in the higher grades were not altogether due to any advantage in condition which the better grades had over the poorer ones, but were due partly at least to the differences in quality in the different grades. It is very doubtful whether lots 1, 2, 3, and 4 were really in as high market condition as were lots 5 and 6. It is another question of course whether or not inferior or common steers are capable of taking on as high finish and absolute fatness as the better grades.

It will be noted that the percentages of caul fat were highest in the poorer grades, being highest in lot 6 and lowest in lot 1. Again lot 1 had the least rough fat, while lot 6 had the most. The carcasses showed conclusively that while the lower grades had the most internal fat, the higher, or better grades, carried thicker surface fat.

While unquestionably the condition of an animal has great influence upon the percentage of dressed beef it will yield, quality appears to be an important factor as well. It could not be said therefore, that the percentages of dressed beef were low in the poorer grades because they were not as well finished, or in other words, not in as high condition as were lots 1, 2, and 3, for neither the appearance of the steers on foot nor their carcasses after slaughter gave any evidence of an unfinished condition in these grades. If there was an advantage in the condition of the steers it was in favor of lots 4, 5, and 6, which were doubtless nearer their maximum limit as to finish than were the better grades, lots 1, 2, and 3.

The following table shows that as a result of feeding the 16 *fancy* feeders in lot 1 until finished, there was only one steer that would not grade as prime. This steer lacked slightly in quality, but principally in condition, and he graded as choice. After slaughtering, the beef experts in Armour & Company's city beef department graded all the carcasses as No. 1.

TABLE 9.—MARKET GRADES AS FEEDERS, FAT CATTLE, AND BEEF.

Lot No.	Market grade at beginning of experiment as feeders. Name of grade and number of steers in each grade.		Market grade at end of experiment as fat cattle. Grade and number of steers in each grade.		Market grade of beef after slaughtering. Name of grade and number of carcasses in each grade.	
1	Fancy,	16	Prime,	15	No. 1,	16
			Choice,	1		
2	Choice,	16	Prime,	14	No. 1,	16
			Choice,	1		
			Good,	1		
3	Good,	16	Prime,	3	No. 1,	16
			Choice,	5		
			Good,	8		
4	Medium,	16	Choice,	1	No. 1, Light,	4
			Good,	4		
			Medium,	8	No. 2 Tops,	12
			Common,	3		
5	Common,	16	Good,	5	No. 1 Light,	4
			Medium,	6	No. 2 Tops,	12
			Common,	5		
6	Inferior,	16	Good,	4	No. 1 Light,	6
			Medium,	6	No. 2 Tops,	9
			Common,	6	No. 3,	1

Of the 16 *choice* feeders (lot 2) fourteen finished as prime, one as choice, and one as good. All the carcasses graded as No. 1 beef.

Of the 16 *good* feeders (lot 3) three finished as prime, five as choice, and eight as good. All the carcasses graded as No. 1.

Of the 16 *medium* feeders (lot 4) one finished as choice, four as good, eight as medium, and three as common. Four of the carcasses in this lot graded as No. 1 light, and the remainder as No. 2 tops.

Of the 16 *common* feeders (lot 5) five finished the test as good, six as medium, and five as common beeves. The grading of the beef was the same as that in lot 4, namely, four carcasses graded as No. 1 light, and twelve as No. 2 tops.

Of the 16 *inferior* feeders (lot 6) four finished as good, six as medium, and six as common. Six carcasses graded as No. 1 light, nine as No. 2 tops, and one as No. 3 beef.

Both this and the preceding table illustrate forcibly the possibility of securing reasonably high percentages of dressed beef of satisfactory grades even with low bred steers if intelligently fed to as high a finish as they are capable of taking.

The records of this experiment all emphasize the great economic importance of condition as a factor in marketing and in determining the grade of beef. It is possible that we have not emphasized this factor enough. Perhaps in the campaign that has been waged to improve the quality of beef cattle, condition has failed to receive the attention which its importance demands. This is but a natural result of confining inves-

tigations in beef production to the live animal. It is safe to say that there are more differences between the well-bred steer and the mongrel-bred feeding steer when on foot in the feed lot than there are after they are fed to a finish, slaughtered, and hung on the hooks.

When fat-cattle prices rule high and there is a tendency for the prices for such cattle to advance, there is a wide range in values between the highest grade of beef cattle, namely, prime steers, and the lowest grade, common rough steers. In other words, a premium is then paid for cattle possessing prime quality or a high percentage of beef blood.

THE FINANCIAL ASPECT OF THE EXPERIMENT.

Many feeders will be interested in the following financial statement. This phase of the subject will be discussed from two standpoints on the basis of:

First, a steady or stationary market, obviously the one which should be looked upon as a normal one, with which other market conditions should be compared.

Second, a falling or declining market.

COST OF FEEDS.

The feeds used were cracked corn (prepared by running ears through an ensilage machine which cut the cobs up into small pieces and cracked the corn), corn and cob meal, cotton seed meal, old process linseed oil meal, clover hay, alfalfa, timothy hay, and corn stover.

These feeds were valued f. o. b. cars, Champaign, Illinois, as follows:

Cracked corn and corn and cob meal	*$12.00 per ton
Cotton seed meal	24.50 per ton
O. P. linseed oil meal	25.00 per ton
Clover hay	8.00 per ton
Alfalfa	10.00 per ton
Timothy hay	12.00 per ton
Corn stover	3.00 per ton

From the time the experiment began until the evening of February 15, the corn used was rather soft and chaffy; it would be called very poor in quality and not well adapted for securing large gains for amount consumed. For convenience, all the corn is figured at the same price.

No charge is made in the financial statement for labor in caring for the steers, interest on the investment, or for bedding, nor on the other hand, is any value assigned to the manure made by the steers. It is believed that the manure would more than balance these expense items.

*$12.00 per ton, or 35 cents per bushel of 70 pounds plus 10 cents per cwt. for grinding.

FINANCIAL STATEMENT ON BASIS OF NORMAL OR STATIONARY MARKET.

Lot 1, 16 Steers.

To 16 Steers, 14,953 lb., at $4.75 per cwt	$ 710.27
26.447 tons cracked corn, and corn and cob meal at $12 per ton	317.36
1.914 tons cotton seed meal, at $24.50 per ton	46.89
1.358 tons O. P. linseed oil meal at $25.00 per ton	33.95
3.885 tons clover hay, at $8.00 per ton	31.08
5.500 tons alfalfa, at $10 per ton	55.00
2.810 tons timothy hay, at $12 per ton	33.72
.845 tons corn stover, at $3 per ton	2.54
Freight Champaign to Chicago, commission, yardage, feed, and other expenses	40.00
Total expenditures	$1270.81
By 16 Steers, 21,960 lb., at $7 per cwt	$1537.20
By 419 lb. Pork, at $5.75 per cwt	24.09
Total receipts	$1561.29
Total expenditures	1270.81
Total gain	$ 290.48
Profit per steer	18.155

Lot 2, 16 Steers.

To 16 Steers, 17,836 lb., at $4.55 per cwt	$ 811.54
31.983 tons cracked corn and corn and cob meal, at $12.00 per ton	383.80
2.270 tons cotton seed meal, at $24.50 per ton	55.62
1.692 tons O. P. linseed oil meal, at $25.00 per ton	42.30
4.503 tons clover hay, at $8.00 per ton	36.02
6.769 tons alfalfa, at $10.00 per ton	67.69
3.281 tons timothy hay, at $12.00 per ton	39.37
.845 tons corn stover, at $3.00 per ton	2.54
Freight Champaign to Chicago, commission, yardage, feed, and other expenses	40.00
Total expenditures	$1478.88
By 16 Steers, 24,650 lb., at $6.90 per cwt.	$1700.85
By 500 lb. Pork, at $5.75 per cwt	28.75
Total receipts	$1729.60
Total expenditures	1478.88
Total gain	$ 250.72
Profit per steer	15.67

Lot 3, 16 Steers.

To 16 Steers, 16,305 lb., at $4.20 per cwt	$ 684.81
29.335 tons cracked corn and corn and cob meal, at $12.00 per ton	352.02
2.066 tons cotton seed meal, at $24.50 per ton	50.62
1.530 tons O. P. linseed oil meal, at $25.00 per ton	38.25
4.372 tons clover hay, at $8.00 per ton	34.98
6.109 tons alfalfa, at $10.00 per ton	61.09
2.999 tons timothy hay, at $12.00 per ton	35.99
.845 tons corn stover, at $3.00 per ton	2.54
Freight Champaign to Chicago, commission, yardage, feed, and other expenses	40.00
Total expenditures	$1300.30
By 16 Steers, 22,430 lb., at $6.50 per cwt	$1457.95
By 475 lb. Pork, at $5.75 per cwt	27.31
Total receipts	$1485.26
Total expenditures	1300.30
Total gain	$ 184.96
Profit per steer	11.56

Lot 4, 16 Steers.

To 16 Steers, 16,355 lb., at $3.85 per cwt.	$ 629.67
28.651 tons cracked corn and corn and cob meal, at $12.00 per ton	343.81
2.069 tons cotton seed meal, at $24.50 per ton	50.69
1.470 tons O. P. linseed oil meal, at $25.00 per ton	36.75
4.410 tons clover hay, at $8.00 per ton	35.28
5.969 tons alfalfa, at $10.00 per ton	59.69
2.981 tons timothy hay, at $12.00 per ton	35.77
.845 tons corn stover, at $3.00 per ton	2.54
Freight Champaign to Chicago, commission, yardage, feed, and other expenses	40.00
Total expenditures	$1234.20
By 16 Steers, 21,980 lb., at $5.80 per cwt.	$1274.84
By 520 lb. Pork, at $5.75 per cwt.	29.90
Total receipts	$1304.74
Total expenditures	1234.20
Total gain	$ 70.54
Profit per steer	4.41

Lot 5, 16 Steers.

To 16 Steers, 15,458 lb., at $3.60 per cwt.	$ 556.49
27.204 tons cracked corn and corn and cob meal, at $12.00 per ton	326.45
1.941 tons cotton seed meal, at $24.50 per ton	47.55
1.409 tons of O. P. linseed oil meal, at $25.00 per ton	35.23
4.332 tons clover hay, at $8.00 per ton	34.66
5.662 tons of alfalfa hay, at $10.00 per ton	56.62
2.881 tons of timothy hay, at $12.00 per ton	34.57
.845 tons corn stover, at $3.00 per ton	2.54
Freight, Champaign to Chicago, commission, yardage, feed, and other expenses	40.00
Total expenditures	$1134.11
By 16 Steers, 21,370 lb., at $5.50 per cwt.	$1175.35
By 420 lb. Pork, at $5.75 per cwt.	24.15
Total receipts	$1199.50
Total expenditures	1134.11
Total gain	$ 65.39
Profit per steer	4.09

Lot 6, 16 Steers.

To 16 Steers, 15,448 lb., at $3.35 per cwt.	$ 517.51
25.801 tons cracked corn and corn and cob meal, at $12.00 per ton	309.61
1.871 tons cotton seed meal, at $24.50 per ton	45.84
1.311 tons O. P. linseed oil meal, at $25.00 per ton	32.78
4.132 tons clover hay, at $8.00 per ton	33.06
5.361 tons alfalfa hay, at $10.00 per ton	53.61
2.983 tons timothy hay, at $12.00 per ton	35.80
.845 tons corn stover, at $3.00 per ton	2.54
Freight, Champaign to Chicago, commission, yardage, feed, and other expenses	40.00
Total expenditures	$1070.75
By 16 Steers, 20,940 lb., at $5.40 per cwt.	$1130.76
By 480 lb. Pork, at $5.75 per cwt.	27.60
Total receipts	$1158.36
Total expenditures	1070.75
Total gain	$ 87.61
Profit per steer	5.48

From the above it will be seen that under normal conditions, that is when the market remains stationary, the best grades of feeding cattle return to the feeder the greatest profit. So striking is this fact that in the preceding financial statement the fancy feeders, on the basis of a stationary market, would have returned to the feeder over three times as much per steer as the inferior feeders. It is well for the cattle feeder to consider the factors which make it possible to make such a showing. Such a favorable showing for the better grade of feeding cattle could not be made if the margins between the price of choice feeders and prime steers were not so large as those between inferior feeders and common rough and medium steers of the beef cattle class.

Profits may be realized on smaller margins in the finishing of the better than the lower grades of feeders. With the higher initial cost of the better grades the cost of feed becomes relatively of less consequence. This being the case it has been found to be almost an invariable rule that the higher the price of feeds, the more sure are the better grades to return to the cattle feeder larger profits than the feeding of the poorer grades. When the cattle market is in any thing like a normal condition, the margins are as great, if not on the average greater, with the better than with the lower grades.

Tables 11 and 12 will be found of unusual interest to the student of the cattle feeding enterprise. These tables show the financial status of the various lots at the end of the first fifty-six days and every four weeks thereafter, except in case of the last period which was but eleven days. It will be observed that this statement is made not only upon the basis of a normal or stationary market, but also on the basis of an abnormal or a falling market, such as obtained during the winter season of 1902-1903. It is thought that a statement at the end of the first thirty days would be of little value, as no one would seriously consider marketing cattle such as were used in this experiment, at the end of thirty days' light grain feeding. In the several columns in Table 11 is recorded the cost of the steers in the various lots up to the dates as given in the marginal columns. This cost includes the initial market value of the cattle, the cost of feed, and the estimated expense of marketing. These items are entered separately that the reader may determine for himself which are items of greatest importance in the various lots and at stated intervals during the progress of the experiment.

To make the financial statements of the several periods comparable in the following statement, it was necessary to use Champaign instead of Chicago weights at the end of the experiment. This explains the apparent discrepancy between the statement of profits shown on pages 182, 183, and 190, as Chicago and not Champaign weights were used in computing profits shown on pages 182 and 183.

TABLE 11.—FINANCIAL STATEMENT AT DIFFERENT DATES ON BASIS OF BOTH FALLING AND STATIONARY MARKET CONDITIONS. CHAMPAIGN WEIGHTS.

Financial statement end of 56 days, Nov. 29, 1902, to Jan. 24, 1903.	DISBURSEMENTS.		MARKET PRICE PER CWT.		RECEIPTS.	
	Station-ary.	Falling.	Station-ary.	Falling.	Station-ary.	Falling.
Lot 1, 16 Steers.						
To 14953 lb. at $4.75	$710.27	$710.27				
Feed, 56 days	124.29	124.29				
Freight, etc.	40.00	40.00				
By 16340 lb. beef			$5.25	$5.00	$857.85	$817.00
105 lb. pork					6.04	6.04
Falling market, loss						51.52
Stationary market, loss					10.67	
	874.56	874.56			874.56	874.56
Lot 2, 16 Steers.						
To 17836 lb. at $4.55	811.54	811.54				
Feed, 56 days	144.14	144.14				
Freight, etc.	40.00	40.00				
By 19145 lb. beef			5.10	4.80	976.40	918.96
190 lb. pork					10.93	10.93
Falling market, loss						65.79
Stationary market, loss					8.35	
	995.68	995.68			995.68	995.68
Lot 3, 16 Steers.						
To 16305 lb. at $4.20	684.81	684.81				
Feed, 56 days	137.56	137.56				
Freight, etc.	40.00	40.00				
By 17350 lb. beef			4.60	4.40	798.10	763.40
130 lb. pork					7.48	7.48
Falling market, loss						91.49
Stationary market, loss					56.79	
	862.37	862.37			862.37	862.37
Lot 4, 16 Steers.						
To 16355 lb. at $3.85	629.67	629.67				
Feed, 56 days	135.02	135.02				
Freight, etc.	40.00	40.00				
By 17225 lb. beef			4.25	4.15	732.06	714.84
160 lb. pork					9.20	9.20
Falling market, loss						80.65
Stationary market, loss					63.43	
	804.69	804.69			804.69	804.69
Lot 5, 16 Steers.						
To 15458 lb. at $3.60	556.49	556.49				
Feed, 56 days	130.97	130.97				
Freight, etc.	40.00	40.00				
By 16305 lb. beef			4.10	3.90	668.51	635.90
130 lb. pork					7.48	7.48
Falling market, loss						84.08
Stationary market, loss					51.47	
	727.46	727.46			727.46	727.46
Lot 6, 16 Steers.						
To 15448 lb. at $3.35	517.51	517.51				
Feed, 56 days	126.89	126.89				
Freight, etc.	40.00	40.00				
By 16545 lb. beef			3.85	3.65	636.98	603.89
115 lb. pork					6.61	6.61
Falling market, loss						73.90
Stationary market, loss					40.81	
	684.40	684.40			684.40	684.40

TABLE 11—Continued.

Financial statement end of 84 days, Nov. 29, 1902, to Feb. 21, 1903.	DISBURSEMENTS.		MARKET PRICE PER CWT.		RECEIPTS.	
	Station-ary.	Falling.	Station-ary.	Falling.	Station-ary.	Falling.
Lot 1, 16 Steers.						
To 14953 lb. at $4.75	$710.27	$710.27				
Feed, 84 days	216.22	216.22				
Freight, etc.	40.00	40.00				
By 17695 lb. beef			$5.55	$5.00	$982.07	$884.75
185 lb. pork					10.64	10.64
Falling market, loss						71.10
Stationary market, profit	26.22					
	992.71	966.49			992.71	966.49
Lot 2, 16 Steers.						
To 17836 lb. at $4.55	811.54	811.54				
Feed, 84 days	250.94	250.94				
Freight, etc.	40.00	40.00				
By 20400 lb. beef			5.55	4.80	1132.20	979.20
285 lb. pork					16.38	16.38
Falling market, loss						106.90
Stationary market, profit	46.10					
	1148.58	1102.48			1148.58	1102.48
Lot 3, 16 Steers.						
To 16305 lb. at $4.20	684.81	684.81				
Feed, 84 days	234.44	234.44				
Freight, etc.	40.00	40.00				
By 18495 lb. beef			5.10	4.65	943.25	860.02
220 lb. pork					12.65	12.65
Falling market, loss						86.58
Stationary market, loss					3.35	
	959.25	959.25			959.25	959.25
Lot 4, 16 Steers.						
To 16355 lb. at $3.85	629.67	629.67				
Feed, 84 days	231.38	231.38				
Freight, etc.	40.00	40.00				
By 18190 lb. beef			4.65	4.50	845.84	818.55
255 lb. pork					14.66	14.66
Falling market, loss						67.84
Stationary market, loss					40.55	
	901.05	901.05			901.05	901.05
Lot 5, 16 Steers.						
To 15458 lb. at $3.60	556.49	556.49				
Feed, 84 days	222.29	222.29				
Freight, etc.	40.00	40.00				
By 17305 lb. beef			4.35	4.40	752.77	761.42
210 lb. pork					12.08	12.08
Falling market, loss						45.28
Stationary market, loss					53.93	
	818.78	818.78			818.78	818.78
Lot 6, 16 Steers.						
To 15448 lb. at $3.35	517.51	517.51				
Feed, 84 days	217.90	217.90				
Freight, etc.	40.00	40.00				
By 17375 lb. beef			4.35	4.40	755.81	764.50
205 lb. pork					11.79	11.79
Stationary market, loss					7.81	
Falling market, profit		.88				
	775.41	776.29			775.41	776.29

TABLE 11—Continued.

Financial statement end of 112 days, Nov. 29, 1902, to March 21, 1903.	DISBURSEMENTS.		MARKET PRICE PER CWT.		RECEIPTS.	
	Stationary.	Falling.	Stationary.	Falling.	Stationary.	Falling.
Lot 1, 16 Steers.						
To 14953 lb. at $4.75	$710.27	$710.27				
Feed, 112 days	302.98	302.98				
Freight, etc.	40.00	40.00				
By 18955 lb. beef			$5.90	$5.20	$1118.35	$985.66
250 lb. pork					14.38	14.38
Falling market, loss						53.21
Stationary market, profit	79.48					
	1132.73	1053.25			1132.73	1053.25
Lot 2, 16 Steers.						
To 17836 lb. at $4.55	811.54	811.54				
Feed, 112 days	354.99	354.99				
Freight, etc.	40.00	40.00				
By 21625 lb. beef			5.90	5.05	1275.88	1092.06
315 lb. pork					18.11	18.11
Falling market, loss						96.36
Stationary market, profit	87.46					
	1293.99	1206.53			1293.99	1206.53
Lot 3, 16 Steers.						
To 16305 lb. at $4.20	684.81	684.81				
Feed, 112 days	329.02	329.02				
Freight, etc.	40.00	40.00				
By 19615 lb. beef			5.45	4.75	1069.02	931.71
285 lb. pork					16.39	16.39
Falling market, loss						105.73
Stationary market, profit	31.58					
	1085.41	1053.83			1085.41	1053.83
Lot 4, 16 Steers.						
To 16355 lb. at $3.85	629.67	629.67				
Feed, 112 days	326.42	326.42				
Freight, etc.	40.00	40.00				
By 19415 lb. beef			5.05	4.65	980.46	902.80
310 lb. pork					17.82	17.82
Falling market, loss						75.47
Stationary market, profit	2.19					
	998.28	996.09			998.28	996.09
Lot 5, 16 Steers.						
To 15458 lb. at $3.60	556.49	556.49				
Feed, 112 days	310.49	310.49				
Freight, etc.	40.00	40.00				
By 18520 lb. beef			4.55	4.50	842.66	833.40
235 lb. pork					13.51	13.51
Falling market, loss						60.07
Stationary market, loss					50.81	
	906.98	906.98			906.98	906.98
Lot 6, 16 Steers.						
To 15448 lb. at $3.35	517.51	517.51				
Feed, 112 days	302.44	302.44				
Freight, etc.	40.00	40.00				
By 18360 lb. beef			4.65	4.50	853.74	826.20
240 lb. pork					13.80	13.80
Falling market, loss						19.95
Stationary market, profit	7.59					
	867.54	859.95			867.54	859.95

TABLE 11—Continued.

Financial statement end of 140 days, Nov. 29, 1902, to April 18, 1903.	DISBURSEMENTS.		MARKET PRICE PER CWT.		RECEIPTS.	
	Station-ary.	Falling.	Station-ary.	Falling.	Station-ary.	Falling.
Lot 1, 16 Steers.						
To 14953 lb. at $4.75 ...	$710.27	$710.27	.....	.....	.....	.....
Feed, 140 days	390.46	390.46	.....	.....	.....	.....
Freight, etc.	40.00	40.00	.....	.....	.....	.....
By 20285 lb. beef	.....	.....	$6.25	$5.40	$1267.81	$1095.39
325 lb. pork	.....	.....	.....	.....	18.69	18.69
Falling market, loss	.....	.....	.....	.....	.....	26.65
Stationary market, profit	145.77	.....	.....	.....	.....	.....
	1286.50	1140.73	.....	.....	1286.50	1140.73
Lot 2, 16 Steers.						
To 17836 lb. at $4.55 ...	811.54	811.54	.....	.....	.....	.....
Feed, 140 days	468.30	468.30	.....	.....	.....	.....
Freight, etc.	40.00	40.00	.....	.....	.....	.....
By 23275 lb. beef	.....	.....	6.30	5.45	1466.33	1268.49
380 lb. pork	.....	.....	.....	.....	21.85	21.85
Falling market, loss	.....	.....	.....	.....	.....	29.50
Stationary market, profit	168.34	.....	.....	.....	.....	.....
	1488.18	1319.84	.....	.....	1488.18	1319.84
Lot 3, 16 Steers.						
To 16305 lb. at $4.20 ...	684.81	684.81	.....	.....	.....	.....
Feed, 140 days	431.97	431.97	.....	.....	.....	.....
Freight, etc.	40.00	40.00	.....	.....	.....	.....
By 21160 lb. beef	.....	.....	5.95	5.15	1259.02	1089.74
340 lb. pork	.....	.....	.....	.....	19.55	19.55
Falling market, loss	.....	.....	.....	.....	.....	47.49
Stationary market, profit	121.79	.....	.....	.....	.....	.....
	1278.57	1156.78	.....	.....	1278.57	1156.78
Lot 4, 16 Steers.						
To 16355 lb. at $3.85 ...	629.67	629.67	.....	.....	.....	.....
Feed, 140 days	427.20	427.20	.....	.....	.....	.....
Freight, etc.	40.00	40.00	.....	.....	.....	.....
By 20845 lb. beef	.....	.....	5.45	5.00	1136.05	1042.25
380 lb. pork	.....	.....	.....	.....	21.85	21.85
Falling market, loss	.....	.....	.....	.....	.....	32.77
Stationary market, profit	61.03	.....	.....	.....	.....	.....
	1157.90	1096.87	.....	.....	1157.90	1096.87
Lot 5, 16 Steers.						
To 15458 lb. at $3.60 ...	556.49	556.49	.....	.....	.....	.....
Feed, 140 days	404.63	404.63	.....	.....	.....	.....
Freight, etc.	40.00	40.00	.....	.....	.....	.....
By 20105 lb. beef	.....	.....	5.15	4.85	1035.41	975.09
295 lb. pork	.....	.....	.....	.....	16.96	16.96
Falling market, loss	.....	.....	.....	.....	.....	9.07
Stationary market, profit	51.25	.....	.....	.....	.....	.....
	1052.37	1001.12	.....	.....	1052.37	1001.12
Lot 6, 16 Steers.						
To 15448 lb. at $3.35 ...	517.51	517.51	.....	.....	.....	.....
Feed, 140 days	390.32	390.32	.....	.....	.....	.....
Freight, etc.	40.00	40.00	.....	.....	.....	.....
By 19925 lb. beef	.....	.....	5.10	4.85	1016.18	966.36
325 lb. pork	.....	.....	.....	.....	18.69	18.69
Falling market, profit...	.....	37.22	.....	.....	.....	.....
Stationary market, profit	87.04	.....	.....	.....	.....	.....
	1034.87	985.05	.....	.....	1034.87	985.05

TABLE 11—Continued.

Financial statement end of 168 days, Nov. 29, 1902, to May 16, 1903.	DISBURSEMENTS.		MARKET PRICE PER CWT.		RECEIPTS.	
	Stationary.	Falling.	Stationary.	Falling.	Stationary.	Falling.
Lot 1, 16 Steers.						
To 14953 lb. at $4.75	$710.27	$710.27				
Feed, 168 days	483.11	483.11				
Freight, etc.	40.00	40.00				
By 21765 lb. beef			$6.75	$5.50	$1469.14	$1197.08
388 lb. pork					22.31	22.31
Falling market, loss						13.99
Stationary market, profit	258.07					
	1491.45	1233.38			1491.45	1233.38
Lot 2, 16 Steers.						
To 17836 lb. at $4.55	811.54	811.54				
Feed, 168 days	583.04	583.04				
Freight, etc.	40.00	40.00				
By 24710 lb. beef			6.65	5.45	1643.22	1346.70
460 lb. pork					26.45	26.45
Falling market, loss						61.43
Stationary market, profit	235.09					
	1669.67	1434.58			1669.67	1434.58
Lot 3, 16 Steers.						
To 16305 lb. at $4.20	684.81	684.81				
Feed, 168 days	535.19	535.19				
Freight, etc.	40.00	40.00				
By 22415 lb. beef			6.35	5.15	1423.35	1154.37
435 lb. pork					25.01	25.01
Falling market, loss						80.62
Stationary market, profit	188.36					
	1448.36	1260.00			1448.36	1260.00
Lot 4, 16 Steers.						
To 16355 lb. at $3.85	629.67	629.67				
Feed, 168 days	526.95	526.95				
Freight, etc.	40.00	40.00				
By 21920 lb. beef			5.65	5.00	1238.48	1096.00
480 lb. pork					27.60	27.60
Falling market, loss						73.02
Stationary market, profit	69.46					
	1266.08	1196.62			1266.08	1196.62
Lot 5, 16 Steers.						
To 15458 lb. at $3.60	556.49	556.49				
Feed, 168 days	500.04	500.04				
Freight, etc.	40.00	40.00				
By 21245 lb. beef			5.35	4.85	1136.61	1030.38
355 lb. pork					20.41	20.41
Falling market, loss						45.74
Stationary market, profit	60.49					
	1157.02	1096.53			1157.02	1096.53
Lot 6, 16 Steers.						
To 15448 lb. at $3.35	517.51	517.51				
Feed, 168 days	479.69	479.69				
Freight, etc.	40.00	40.00				
By 20825 lb. beef			5.30	4.85	1103.73	1010.01
410 lb. pork					23.58	23.58
Falling market, loss						3.61
Stationary market, profit	90.11					
	1127.31	1037.20			1127.31	1037.20

TABLE 11—Continued.

Financial statement end of 179 days, Nov. 29, 1902, to May 28, 1903.	DISBURSEMENTS.		MARKET PRICE PER CWT.		RECEIPTS.	
	Station-ary.	Falling.	Station-ary.	Falling	Station-ary.	Falling.
Lot 1, 16 Steers.						
To 14953 lb. at $4.75 ...	$710.27	$710.27	.....	.....	.....	.....
Feed, 179 days	520.54	520.54	.....	.....	.....	.....
Freight, etc.	40.00	40.00	.....	.....	.....	.....
By 22315 lb. beef	.....	.....	$7.00	$5.40	$1562.05	$1205.01
419 lb. pork	.....	.....	.....	.....	24.09	24.09
Falling market, loss	.....	.....	.....	.....	.....	41.71
Stationary market, profit	315.33	.....	.....	.....	.....	.....
	1586.14	1270.81	.....	.....	1586.14	1270.81
Lot 2, 16 Steers.						
To 17836 lb. at $4.55 ...	811.54	811.54	.....	.....	.....	.....
Feed, 179 days	627.34	627.34	.....	.....	.....	.....
Freight, etc.	40.00	40.00	.....	.....	.....	.....
By 25120 lb. beef	.....	.....	6.90	5.40	1733.28	1356.48
500 lb. pork	.....	.....	.....	.....	28.75	28.75
Falling market, loss	.....	.....	.....	.....	.....	93.65
Stationary market, profit	283.15	.....	.....	.....	.....	.....
	1762.03	1478.88	.....	.....	1762.03	1478.88
Lot 3, 16 Steers.						
To 16305 lb. at $4.20 ...	684.81	684.81	.....	.....	.....	.....
Feed, 179 days	575.49	575.49	.....	.....	.....	.....
Freight, etc.	40.00	40.00	.....	.....	.....	.....
By 23010 lb. beef	.....	.....	6.50	5.15	1495.65	1185.01
475 lb. pork	.....	.....	.....	.....	27.31	27.31
Falling market, loss	.....	.....	.....	.....	.....	87.98
Stationary market, profit	222.66	.....	.....	.....	.....	.....
	1522.96	1300.30	.....	.....	1522.96	1300.30
Lot 4, 16 Steers.						
To 16355 lb. at $3.85 ...	629.67	629.67	.....	.....	.....	.....
Feed, 179 days	564.53	564.53	.....	.....	.....	.....
Freight, etc.	40.00	40.00	.....	.....	.....	.....
By 22450 lb. beef	.....	.....	5.80	4.90	1302.10	1100.05
520 lb. pork	.....	.....	.....	.....	29.90	29.90
Falling market, loss	.....	.....	.....	.....	.....	104.25
Stationary market, profit	97.80	.....	.....	.....	.....	.....
	1332.00	1234.20	.....	.....	1332.00	1234.20
Lot 5, 16 Steers.						
To 15458 lb. at $3.60 ...	556.49	556.49	.....	.....	.....	.....
Feed, 179 days	537.62	537.62	.....	.....	.....	.....
Freight, etc.	40.00	40.00	.....	.....	.....	.....
By 21780 lb. beef	.....	.....	5.50	4.80	1197.90	1045.44
420 lb. pork	.....	.....	.....	.....	24.15	24.15
Falling market, loss	.....	.....	.....	.....	.....	64.52
Stationary market, profit	87.94	.....	.....	.....	.....	.....
	1222.05	1134.11	.....	.....	1222.05	1134.11
Lot 6, 16 Steers.						
To 15448 lb. at $3.35 ..	517.51	517.51	.....	.....	.....	.....
Feed, 179 days	513.24	513.24	.....	.....	.....	.....
Freight, etc.	40.00	40.00	.....	.....	.....	.....
By 21055 lb. beef	.....	.....	5.40	4.80	1136.97	1010.64
480 lb. pork	.....	.....	.....	.....	27.60	27.60
Falling market, loss	.....	.....	.....	.....	.....	32.51
Stationary market, profit	93.82	.....	.....	.....	.....	.....
	1164.57	1070.75	.....	.....	1164.57	1070.75

TABLE 12.—SUMMARY OF TABLE 11, SHOWING PROFITS OR LOSSES AT STATED INTERVALS DURING EXPERIMENT BOTH ON STATIONARY AND FALLING MARKET.

Lot No.		Statement Jan. 24, 1903, end of 56 days.		Statement Feb. 21, 1903, end of 84 days.		Statement Mar. 21, 1903, end of 112 days.		Statement Apr. 18, 1903, end of 140 days.		Statement May 16, 1903, end of 168 days.		Statement May 28, 1903, end of 179 days.	
		Loss.	Profit.	Loss.	Profit.	Loss.	Profit.	Loss.	Profit.	Loss.	Profit.	Loss.	Profit.
1	Falling.	51.52	.....	71.10	.....	53.21	.....	26.65	.....	13.99	.....	41.71	.....
	Stationary.	10.67	.....	.....	26.22	.....	79.48	.....	145.77	.....	258.07	.....	315.33
2	Falling.	65.79	.....	106.90	.....	96.36	.....	29.50	.....	61.43	.....	93.65	.....
	Stationary.	8.35	.....	.....	46.10	.....	87.46	.....	168.34	.....	235.09	.....	283.15
3	Falling.	91.49	.....	86.58	.....	105.73	.....	47.49	.....	80.62	.....	87.98	.....
	Stationary.	56.79	.....	3.35	.....	.....	31.58	.....	121.79	.....	188.36	.....	222.66
4	Falling.	80.65	.....	67.84	.....	75.47	.....	32.77	.....	73.02	.....	104.25	.....
	Stationary.	63.43	.....	40.55	.....	.....	2.19	.....	61.03	.....	69.46	.....	97.80
5	Falling.	84.08	.....	45.28	.....	60.07	.....	9.07	.....	45.74	.....	64.52	.....
	Stationary.	51.47	.....	53.93	.....	50.81	.....	.....	51.25	.....	60.49	.....	87.94
6	Falling.	73.90	.....	.....	.88	19.95	.....	.....	37.22	3.61	.....	32.51	.....
	Stationary.	40.81	.....	7.81	.....	.....	7.59	.....	87.04	.....	90.11	.....	93.82

It will be seen in Table 12 that at no time during the course of the experiment would it have been possible to sell any of the six lots of steers profitably on the basis of a falling or the actual market except in the case of the inferior cattle. These could have been marketed profitably at the close of the third or fifth four-week periods of the experiment. Up to the end of the second period, January 24, 1903, none of the grades could have been sold profitably on either the actual market or a market identical with that of November 29, 1902, when the experiment began. February 21, three months from the opening of the experiment, the fancy and choice lots could have been sold at a profit on the basis of a stationary market. At the end of the fourth period, and thereafter, any of the lots would have sold profitably on a stationary market excepting the common grade at the close of the fourth period.

These results go to show that the early months of the feeding period are not of necessity the most profitable months as many feeders suppose. Indeed in this case the opposite was true. The fact that all of the cattle were given a partial grain ration during the four weeks preceding the test doubtless detracted from the gains which would otherwise have been shown in the first period, because the first increase in weight by steers in the average feed lot is attributed largely to "fill."

Under normal market conditions, that is, when prevailing prices of beef steers remain about stationary, the better grades of feeding cattle begin returning a profit sooner than do the lower grades, as is shown by the summary in Table 12. For example, the fancy and choice steers could have been profitably disposed of four weeks earlier than either the good, medium, common, or inferior grades, assuming a steady market throughout the experiment. Further, on April 18, the earliest date at which the statement shows a balance to the credit of all the grades, on a stationary market, the fancy, choice, and good cattle had earned an average profit relatively more than twice as great as that of the three lower grades.

That conditions were unusual and unfavorable for making it possible to show that any one of the lots was fed at a profit in the feeding experience, the results of which are detailed in this bulletin, in no way lessens the value of this experiment. The prices prevailing for feeds were normal, the unusual factor was that of the radical decline in the market. However, the data derived are independent of the particular market conditions at this time and serve as a basis for calculating profits or losses under varying market conditions.

Under the conditions prevailing at the time of this experiment, all lots were fed at a loss. The records of this experiment show definitely the extent and cause of such losses, which were occasioned by the decline in cattle values during the six months of this experiment. It will be seen that the different lots did not prove equally unprofitable. A careful study of the various factors which affect profit and loss in steer

feeding will reveal in each instance the factor or factors most concerned in bringing about these variations in losses.

Lot 6, the inferior feeders, were fed with smallest loss under this declining market. Table 13 shows that steers such as represented lot 6 declined least in the market. This indicates that less loss was occasioned by this factor here than in any other lot. This one fact would undoubtedly account for the smaller loss, but it is not the only advantage this lot possessed. Table 5 shows that these steers made the smallest relative and absolute gains in beef during feeding. Notwithstanding this fact they were in good marketable condition. Gains in live weight of steers are generally made at a loss, that is a pound of gain in beef usually costs more than it will sell for on the market, hence, that lot of steers which can be increased in value per hundred weight by putting on the least number of pounds gain, other things being equal, will have an advantage over other steers putting on greater gains, but increasing no more rapidly in value per hundred weight. There was also a very slight advantage in this lot over some of the others in the amount of pork produced.

Lot 1 stands second in its financial showing under the falling market, Table 13. Its advantage over other lots came from the fact that, as is shown in Table 5, they made by far the best gains for food consumed. That this is an all important factor will be better appreciated when it is known that in practically all other respects this lot was at a decided disadvantage. The disadvantages referred to were that they made larger gains than any other lot, hence sustained greater loss from this factor; their increase per hundred weight during fattening was the least of all lots, and they were the lightest weight at the beginning. The amount of pork produced was the smallest. The importance of securing gains in live weight economically is still further emphasized in the showing made by the steers in lot 5, which stood next to lot 1 as economical producers. A portion of what they lost in economy of production was offset by the fact that they stood second highest in increase in value per hundred weight during feeding. Only two other lots made smaller gains. These factors account for the relatively good showing of lot 5.

Lot 3 made a better financial showing than lot 2, because the increase in value per hundred weight during feeding was greater; the cost of a pound of gain was less, the gains smaller and the pork produced was greater.

The steers in lot 2 did not make as good gains for food consumed as some other lots; this was undoubtedly partially due to the fact that they were the largest framed and heaviest weight steers in the experiment. The advantage they possessed in having greater weight at the outset, which would normally amount to a considerable item in the

increase per hundred weight on original weight, was not in this instance, an important factor, as the actual increase per hundred weight during feeding was small. This lot was again at a disadvantage financially in making relatively large gains.

But little can be said for lot 4; they made a bad showing in a most unfavorable year. Their gains in beef were expensive. They apparently possessed but few of the advantages accorded either the better or the poorer grades, and were possessed of some of the disadvantages found to be present in each of them.

TABLE 13.—ACTUAL DECLINE IN MARKET VALUE PER HUNDRED WEIGHT BY MONTHS ON BASIS OF MARKET OF NOVEMBER 29, 1902, AND TOTAL DECLINE.

Lot No.	Nov. 29 to Jan. 24, 56 days.	Jan. 24 to Feb. 21, 28 days.	Feb. 21 to Mar. 21, 28 days.	Mar. 21 to Apr. 18, 28 days.	Apr. 18 to May 16, 28 days.	May 16 to May 28, 11 days.	Total, Nov. 29 to May 28, 179 days.	Actual margin per cwt. from Nov. 29 to May 28, 179 days.
1	$0.25	$0.30	$0.15	$0.15	$0.40	$0.35	$1.60	$0.65
2	.30	.45	.10	.00	.35	.30	1.50	.85
3	.20	.25	.25	.10	.40	.15	1.35	.95
4	.10	.05	.25	.05	.20	.25	.90	1.05
5	.20	*+.25	.10	.25	.20	.20	.70	1.20
6	.20	*+.25	.20	.10	.20	.15	.60	1.45

*The + sign here is used to signify that instead of a decline in the market for such steers as represented, lots 5 and 6, there was an actual advance of twenty-five cents per hundred weight during the second four weeks of the test. The market for those grades therefore was practically the same on January 24, 1903, as it was at the beginning of the experiment, November 29, 1902.

With the two exceptions noted there was a steady but somewhat irregular decline in the market for all grades from November 29 to May 28. This decline was much greater in the better grades than in the poorer ones. This is due partly to the fact that the prices for fancy, choice, and good feeding cattle, and those prevailing for prime, choice, and good beeves were relatively high, the former because there was a great demand for feeders possessing quality, and the latter because just at the Christmas holiday season, prices for good fat cattle are apt to be relatively higher than those for the lower grades.

As the holidays passed and the season advanced, the supply of prime, choice, and good steers was so liberal that prices dropped on these grades more rapidly than on others.

In the last column will be found the actual margin of selling over purchase price for each grade. By comparing these margins with the figures in the next column to the left, it will be seen that, except in lots 4, 5, and 6, the margins of actual market transactions were not as great as the actual decline in the market. To put it in another way, under existing market conditions the market declined more rapidly than the steers increased in value during the fattening process. This is a most unusual circumstance, but one which the cattle feeder is all too frequently obliged to meet.

TABLE 14.—VALUE OF STEERS BY PERIODS ON BASIS OF STATIONARY AND FALLING MARKET.

		Lot 1.	Lot 2.	Lot 3.	Lot 4.	Lot 5.	Lot 6.	Av'rage by periods for 6 lots.
Nov. 29, 1902.	Actual market value per cwt. beginning of experiment	$4.75	$4.55	$4.20	$3.85	$3.60	$3.35	.....
	Increase in market value per cwt. in 4 weeks on basis of stationary market	.25	.20	.20	.20	.25	.25	$0.255
Dec. 27, 1903.	Market value per cwt. basis of stationary market	5.00	4.75	4.40	4.05	3.85	3.60	.....
	Actual market value per cwt. basis of existing market conditions	.....	.....	.....	.....	.....	.....	.....
	Increase in market value per cwt. in 4 weeks on basis of stationary market	.25	.35	.20	.20	.25	.25	.250
Jan. 24, 1903.	Market value per cwt. basis of stationary market	5.25	5.10	4.60	4.25	4.10	3.85	.....
	Actual market value per cwt. basis of existing market conditions	5.00	4.80	4.40	4.15	3.90	3.65	.....
	Increase in market value per cwt. in 4 weeks on basis of stationary market	.30	.45	.50	.40	.25	.50	.400
Feb. 21, 1903.	Market value per cwt. basis of stationary market	5.55	5.55	5.10	4.65	4.35	4.35	.....
	Actual market value per cwt. basis of existing market conditions	5.00	4.80	4.65	4.50	4.40	4.40	.....
	Increase in market value per cwt. in 4 weeks on basis of stationary market	.35	.35	.35	.40	.20	.30	.325
Mar. 21, 1903.	Market value per cwt. basis of stationary market	5.90	5.90	5.45	5.05	4.55	4.65	.....
	Actual market value per cwt. basis of existing market conditions	5.20	5.05	4.75	4.65	4.50	4.50	.....
Apr. 18, 1903.	Increase in market value per cwt. in 4 weeks on basis of stationary market	.35	.40	.50	.40	.60	.45	.45

TABLE 14—Continued.

		Lot 1.	Lot 2.	Lot 3.	Lot 4.	Lot 5.	Lot 6.	Av'rage by periods for 6 lots.
Apr. 18, 1903.	Market value per cwt. basis of stationary market	$6.25	$6.30	$5.95	$5.45	$5.15	$5.10	.....
	Actual market value per cwt. basis of existing market conditions	5.40	5.45	5.15	5.00	4.85	4.85	.....
	Increase in market value per cwt. in 4 weeks on basis of stationary market	.50	.35	.40	.20	.20	.20	$.308
May 16, 1903.	Market value per cwt. basis of stationary market	6.75	6.65	6.35	5.65	5.35	5.30	.....
	Actual market value per cwt. on basis of existing market conditions..	5.50	5.45	5.15	5.00	4.85	4.85	.....
	Increase in market value per cwt. in 11 days on basis of stationary market	.25	.25	.15	.15	.15	.10	.175
May 28, 1903.	Market value per cwt. basis of stationary market	7.00	6.90	6.50	5.80	5.50	5.40	.....
	Actual market value per cwt. on basis of existing market conditions..	5.40	5.40	5.15	4.90	4.80	4.80	.....
	Actual total increase per cwt. in 179 days on basis market conditions Nov., 1902, to May, 1903	.65	.85	.95	1.05	1.20	1.45	.....
	Total increase per cwt. on basis of stationary market, Nov., 1902. ..	2.25	2.35	2.30	1.95	1.90	2.05	.....
	Average increase per cwt. per month on basis of stationary market	.375	.392	.383	.325	.317	.342	.356

The foregoing tabulated statement illustrates a feature of the investigation under study. Among the many difficult and important questions which the cattle feeder must decide is, at what stage of the fattening process may steers be marketed with greatest profit? How largely does the answer to this question depend upon the grade of cattle fed? And finally, do market fluctuations have a bearing upon the answer to this question? From the above table it will be seen that on a basis of a stationary market there would have been a margin between the buying

and selling price in lot 1 of $2.25 per hundred weight; in lot 2, of $2.35; lot 3, $2.30; lot 4, $1.95; lot 5, $1.90; and lot 6, $2.05. These margins as will subsequently be shown would have made handsome profits for the cattle feeder on all the grades. Unfortunately for the financial showing made in the actual transactions of this experiment the margins over the cost price were very small indeed. They were as follows: In lot 1, $0.65; in lot 2, $0.85; in lot 3, $0.95; in lot 4, $1.05; in lot 5, $1.20; and in lot 6, $1.45 per hundred weight.

The margins recorded in the table as estimated on the basis of a stationary market are somewhat unusual in that the margins for the better grades are rather too large as compared with those of the lower grades. It is true that the actual margins computed on the basis of prevailing market conditions are much more unusual. The variations in margins from the normal as based upon a stationary market are too slight, however, to render a comparison of margins between the grades impracticable; in fact, there is much of value that can be learned from such comparison. While it is true that by using the Christmas holiday market as the basis for values of beef cattle on stationary market the estimated values of prime steers as compared with medium and common grades of beef cattle are relatively high, it is equally true that the estimated value of fancy, choice, and good feeding cattle was correspondingly high at this season in 1902. The average increase per hundred weight a month on the basis of a stationary market for the three best grades, lots 1, 2, and 3, was slightly more than 38 cents. The average increase per hundred weight a month on a basis of actual market conditions in the three best grades was but little more than 13 cents.

Two factors contributed to make the margins exhibited in lots 4, 5, and 6 characteristic. First, the market did not decline either as much or as rapidly as in the better grades, and second, these grades increased in value per hundred weight rather more rapidly than is common. Much therefore is to be gained by making a careful study of the financial statement concerning lots 4, 5, and 6.

In general, it may be said that where two-year-old steers are gaining at the rate of two and one-half pounds per steer a day on rations calculated to produce that finish demanded in the market, and that in a reasonably short time with feeds at average prices, they will increase in market value at the rate of from $0.20 to $0.30 per hundred weight a month, providing of course the market does not decline in the meantime.

Another point that should be noted in this table is that at the beginning of the experiment the market value of the various lots was such that lot 1 was $0.20 per hundred weight more valuable than lot 2. Lot 2 was $0.25 per hundred weight more valuable than lot 3; lot 3, $0.35 per hundred weight more valuable than lot 4; lot 4, $0.25 per hundred weight more valuable than lot 5; lot 5, $0.25 more valuable per hundred

weight than lot 6; lot 1 was $1.40 more valuable per hundred weight than lot 6.

At the end of the experiment these differences were much less marked; lots 1 and 2 were sold on the market at the same price. They were considered only $0.25 per hundred weight more valuable for slaughter than lot 3, and lot 3 $0.25 per hundred weight more valuable than lot 4. Lots 5 and 6 were considered of equal value for killing purposes and but $0.10 per hundred weight less valuable than lot 4. When marketed lot 1 was considered only $0.60 per hundred weight more valuable than lot 6.

As bearing on the financial aspect of this experiment and cattle feeding in general it may be said that market values are bound to vary considerably from those obtained during this experiment. Cost of gains under favorable conditions need not be materially different from those in this experiment. It is interesting to note that for the feeder to have come out even and neither to have made nor lost by the feeding of the various grades in this experiment it would have been necessary to have secured margins as follows: Lot 1, $0.93; lot 2, $1.13; lot 3, $1.48; lot 4, $1.63; lot 5, $1.59; and lot 6, $1.63. This illustrates a fact which every cattle feeder should understand, viz., that the lower the price at which feeding cattle are purchased, no matter whether this low price is chiefly due to a prevailing dull and low market or to the fact of the cattle being poor in grade, the larger the margin must be to secure protection against loss.

The accompanying table illustrates the relative gains of about half of the individual steers in the different lots. On January 19, just fifty days after the experiment began, a metal ear label was inserted in the left ear of each steer in lot 6; on the following day, January 20, ear labels were inserted in the ears of lots 4 and 5; on January 21 in lots 2 and 3; and on January 22 in lot 1. The weight of each steer was taken just before the label was inserted. It was the intention to weigh each steer at the end of the experiment and thus determine the individual gains of each one in each lot.* This was found to be impracticable as many of the labels were soon lost and the placing of duplicates would have been a constant annoying and disturbing factor to be reckoned with in any results which final records might show. It was thought advisable, therefore, not to attempt to secure a complete record of individual gains but simply of those steers that had fortunately retained their ear labels to the last. This question of individual gains was not a part of the experiment as planned and the absence of these records does not in any way affect data which will be used to determine the object of this experiment. The incomplete record

*Experience at this Station goes to show that the metal ear label is much less liable to tear out when placed on the upper edge than on the lower edge, as recommended.

TABLE 15.—INDIVIDUAL WEIGHTS AND GAINS OF STEERS.

Lot No.	No. of steer.	Weight of steer, Jan. 22.	Wt. of steer, Champaign, May 27.	Gain in 125 days.	Average daily gain.
1	101	885	1315	430	3.44
1	102	905	1315	410	3.28
1	103	1020	1285	265	2.12
1	104	1065	1455	390	3.12
1	107	1120	1600	480	3.84
1	108	965	1250	285	2.28
1	111	990	1315	325	2.60
1	112	1050	1445	395	3.16
1	113	1045	1425	380	3.04
		Jan. 21		126 days	
2	119	1245	1675	430	3.41
2	121	1265	1580	315	2.50
2	122	1135	1465	330	2.61
2	123	1295	1670	375	2.97
2	126	1185	1400	215	1.70
3	135	985	1295	310	2.46
3	137	1120	1380	260	2.06
3	138	1010	1440	430	3.41
3	140	1350	1730	380	3.01
3	147	975	1410	435	3.45
3	148	1030	1440	410	3.25
		Jan. 20		127 days	
4	151	1140	1250	110	.866
4	153	1025	1385	360	2.83
4	157	1085	1375	290	2.28
4	158	1130	1455	325	2.55
4	159	1250	1540	290	2.28
4	163	1125	1465	340	2.67
4	164	1075	1375	300	2.36
5	165	950	1300	350	2.75
5	166	1030	1350	320	2.51
5	168	1135	1500	365	2.87
5	169	1070	1460	390	3.07
5	171	1005	1285	280	2.20
5	172	1070	1340	270	2.12
5	173	985	1300	315	2.48
5	175	1030	1300	270	2.12
5	176	990	1375	385	3.03
5	178	895	1210	315	2.48
5	179	985	1400	415	3.26
5	180	1130	1475	345	2.71
		Jan. 19		128 days	
6	181	1060	1370	310	2.42
6	182	1045	1390	345	2.69
6	183	925	1225	300	2.34
6	184	1180	1395	215	1.67
6	185	925	1215	290	2.26
6	186	1000	1315	315	2.46
6	188	955	1290	335	2.61
6	189	1020	1425	405	3.16
6	190	1160	1445	285	2.22
6	192	965	1295	330	2.57
6	193	1055	1305	250	1.95
6	195	1110	1190	80	.625
6	196	925	1175	250	1.95

illustrates a point or two worthy of notice; first, that as far as these records go, the steer that made the greatest average daily gain was steer No. 107 in lot 1, while the steer making the lowest average daily gain was No. 195 in lot 6. The former gained at the rate of 3.840 pounds a day, while the latter gained only .625 of a pound per day. This difference is extreme and must be looked upon as an individual rather than a grade characteristic. Careful study of the above table reveals the fact that the steers in the better grades were not only more rapid gainers, but also much more uniform in their daily gains than the steers in the lower grades. The steers with high average daily gains in lot 1 were the rule while the steers with such averages in lot 6 were very unusual indeed. The individual gains in the other lots indicate that the better bred the steer the more uniform and consistent his gains.

Steer No. 107 in lot 1 gaining nearly four pounds per day for four months, and that under carload feed lot conditions on a steer well fleshed as a feeder, but shows the opportunity and illustrates the possibilities in store for the systematic, painstaking breeder of beef cattle who will continue to select his animals to improve them in this rapid gaining, early maturing quality. Perhaps no other characteristic of beef cattle has received greater attention at the hands of breeders than this one. The fact that this one steer practically stands in a class by himself indicates that there is still opportunity for further improvement along this line. This opportunity should be made the most of by breeders of beef cattle until it can no longer be said that beef production can only be engaged in by well-to-do farmers since returns are slow and capital is too long tied up without cash returns.

It would indeed be interesting to know the relative cost of beef on these two steers to which reference has been made, namely No. 107 in lot 1 and No. 195 in lot 6. This of course could not be determined in this test without seriously interfering with the car-lot conditions believed to be so essential as a practical feature of this experiment. In general it is clear that the steer making the greatest gains consumed the most feed. He was always one of the first at the trough as soon as the feed was distributed and among the last to leave it; when he did, he seemed satisfied and contented. He had a proud, stately carriage that would become individuals of any species of the animal kingdom. On the contrary, the slow gaining steer was dainty and delicate about his eating and seldom showed signs of having enjoyed or made good use of his meal. He had that dull "hang-dog" look that always accompanies slight grudging, and inefficient expenditure of energy.

These evidences of better gaining capacity seemed to stand out more clearly during the feeding process or after a closer acquaintance secured by actual every day contact with the steers than in the yards as feeders. This suggests the importance of the great advantage of breeding the

feeders which one finishes. A system of beef production that involves the breeding and finishing of the steers by the same individual gives opportunity to discard the feeders which do not promise well before too much expensive feed has been wasted in trying to finish them for the market.

CONCLUSIONS.

1. More rapid and much larger gains may be secured on the better than on the more common grades.

2. The results of this experiment clearly show that when the various grades of beef cattle are put in the best marketable condition there is a very definite relation between the percentages of dressed beef and the grade of cattle involved. The better the grade of cattle the higher the percentages of dressed beef.

3. Low grade cattle carry larger percentages of internal fat than the better bred ones, while there appears to be a more abundant and more evenly distributed layer of surface fat on the better bred steers.

4. As the differences between feeders tend to disappear as the feeding process goes on, the differences in quality between the various grades of feeding cattle are more pronounced than such differences between the various grades of beef or fat cattle. Quality is the more important in feeding cattle; condition in fat cattle.

5. Primarily this experiment was outlined to determine the relation between the grade of feeding steers and their "feeding qualities"; that is, whether the quality of a feeder determines his capacity for making gains, his ability to use feed economically, and the nature of the gains made. However, both the market and slaughter tests of the various grades as finished clearly indicate that to the packer and butcher condition is of first importance.

6. The grade of cattle the finishing of which will return to the cattle feeder the greatest profit will depend upon the following considerations:

(a) The relative ability of the various grades to use feed for the production of gain and finish as shown by the data in this bulletin. See Table 7.

(b) The relative cost of the various grades of feeding cattle.

(c) Cost of feed.

(d) The method of feeding and time of marketing.

(e) The range in prices between prime and common rough steers or between the highest and lowest grades of beef cattle.

7. The greater the cost of the feed used, the greater is the advantage in favor of the better grades, both because under normal market conditions, in these grades the gains and finish are put on with less relative feed consumption than in the lower ones, although this difference is less marked in the inferior than in the intermediate grades

and because the cost of feed is a larger factor in the feeding of the lower than the higher grades.

8. The greater the spread in the market between the various grades of feeders, the more is the advantage in favor of the commoner grades. As a rule the price of common rough steers fluctuates less than the price for prime steers and the price of the inferior and common grades of feeders varies less than those of the choice and fancy grades.

9. A concentrated ration and shorter feeding period tend to favor the feeding of the lower grades, that is, a ration with a wide nutritive ratio like corn and timothy hay or straw without the addition of a nitrogenous concentrate or roughage and where the concentrate comprises a large percentage of the ration would favor cattle of the lower grades because they are older and the process of finishing is largely a process of fattening.

Again prices for the lower grades of fat or beef cattle are more or less affected by range and holiday competition and are usually relatively low at such seasons.

10. Older cattle of the more common grades can undoubtedly be put in marketable condition on a shorter full feed period than can younger cattle of the same weight which would grade higher, because the older the cattle the less the increase in weight required to finish them.

11. The greater the spread in the market between the various grades of fat steers the more is the advantage in favor of the better grades.

12. Opportunities for larger profits, and losses as well, lie with the better grades of feeders.

13. Steers containing high percentages of beef blood possess greater capacity for consuming large quantities of feed than steers of a more common grade, especially in the later weeks.

14. Age and condition as well as quality are important factors to be reckoned with in the management of the various grades of feeding cattle. Speaking generally of the offerings of feeding cattle at any of our leading markets it is safe to say that the better the quality and condition the younger the cattle. In securing 900 to 1,000 pound feeding cattle of the more common grades one is bound to get cattle of advanced age, say three years old at least. Choice and fancy feeders of these weights can be secured in short two-year-old cattle.

15. Steers of all grades may be finished or put in good marketable condition without carrying them to a point of fatness which necessitates small gains for food consumed.

16. The margins necessary to protect against loss in finishing the various grades of feeders are dependent upon:

(a) The grade and cost of the cattle.
(b) The price of feeds.
(c) The initial weight of the cattle.
(d) The length of the feeding period.

17. The lower the price at which feeding cattle are purchased, whether because of prevailing low prices for feeders or because of the low grade of the cattle, the larger must be the margin between the buying and selling price in order to secure protection against loss.

18. The greater the cost of the feed necessary for finishing feeders, the larger must be the margin.

19. Feeding cattle of heavy weights can be finished profitably on a narrower margin than can light weight feeders.

20. Feeding cattle which require an extended feeding period for finishing require a larger margin than do feeders which can be matured in a shorter time.

GENERAL OBSERVATIONS.

Beef production on an extensive scale is an enterprise in which the uninformed and inexperienced can not afford to engage. For several years it has been developing into a more complex and difficult, and therefore a more hazardous business. Conditions as to market price of feeding and fat cattle and cost of feeds have never been identical during any two consecutive years and seldom more than similar at irregular intervals. Thus the man who masters the science and art of beef production in such a way as to make it profitable is a master indeed.

It is reasonable to assume that the problems confronting the men who market a large part of the fat cattle of America are the problems that should engage the attention of the investigator. It is estimated that 85 percent of the native beef cattle marketed in Chicago have been previously bought as feeders and finished by cattle feeders who do not raise the cattle they feed. In most respects the improvement in beef cattle has been along lines calculated to render them more valuable and profitable to cattle raisers who breed and develop the cattle they finish for the block, rather than to render them especially fitted for the enterprise engaged in by so many of our cattle men, namely, that of buying in the market or on the range, feeders that have been grown and developed to the point of finishing. To be more specific it may be said that the improvement in beef cattle has been along the lines of earlier maturity, refinement of form, and reduction of the percentage of bone and other products of the steer less valuable than beef. Thus it may appear on first thought that breeders have lost sight of their greatest opportunity by not rendering their cattle pre-eminently the cattle for the feed lot no matter what the varying conditions affecting this enterprise may happen to be. More careful consideration of the subject, however, will surely convince the student of beef production that all these years of improvement in beef cattle have not been in vain, for some one must breed and rear the calves that will eventually find their way to the feed lot and subsequently to market. All conditions indicate that ultimately

more of the steers fed in the corn belt will be reared there. Evidence of the superiority of the well bred steer for this purpose is too manifest to require discussion at this time.

Notwithstanding the fact that breeders have improved the early maturing quality of beef cattle to a greater extent than any other, the wide variations in the gains of individual steers within the grades of feeding cattle used in this experiment point strongly to the possibility of still further improvement along this line. Breeders of beef cattle should not be slow to take advantage of this opportunity.

Incidentally the results of this experiment show which of the six grades of feeding cattle was fed with the least loss under conditions which have prevailed during the winter of 1902-'03, and the data will also afford a basis for computing probable profits under varying market conditions. Experienced feeders believe that the largest factors in determining the relative profits in feeding the different grades of cattle are local and market conditions. It is obvious that cattle feeders can not control the markets for their cattle; they should understand fully, however, the bearing which market conditions have upon the question of what grade of feeding cattle is likely to return to the feeder the greatest profits in any given year. The big questions are, of course, the relative rapidity, extent, nature, and cost of gains with the various grades.

When prices rule low in the beef cattle class and the market is dull and has a downward tendency, the range of prices between prime steers and common rough steers is narrow, and as a result, condition or fat is more important than quality or beef blood. As a rule, prices of common rough steers in the beef cattle class fluctuate less than the prices for prime steers. Hence, it will be seen that in general there is less liability to large losses from market fluctuations in the feeding of the commoner than the better grades of feeding cattle. On the other hand the chances for making large profits are undoubtedly greatest with the better grades. As a feeding proposition there is perhaps a larger element of speculation involved in the handling of the well-bred than the common-bred steer. It is best for the beginner to handle a few loads of the commoner kinds, as the chances for heavy losses are thereby reduced to the minimum, and the capital involved is not large. It is well, however, to bear in mind that cattle of common and inferior grades must be purchased at a low price or what has been said will not be true, for under ordinary conditions the margin for profit in feeding low grade cattle is slight.

By reducing the corn fed to meal and mixing same with roughage the importance of pork production as a factor in cattle feeding is minimized. Notwithstanding this, the pig, even under such conditions, should not be eliminated. Properly managed he may return a credit to each steer fed of approximately $2.00.

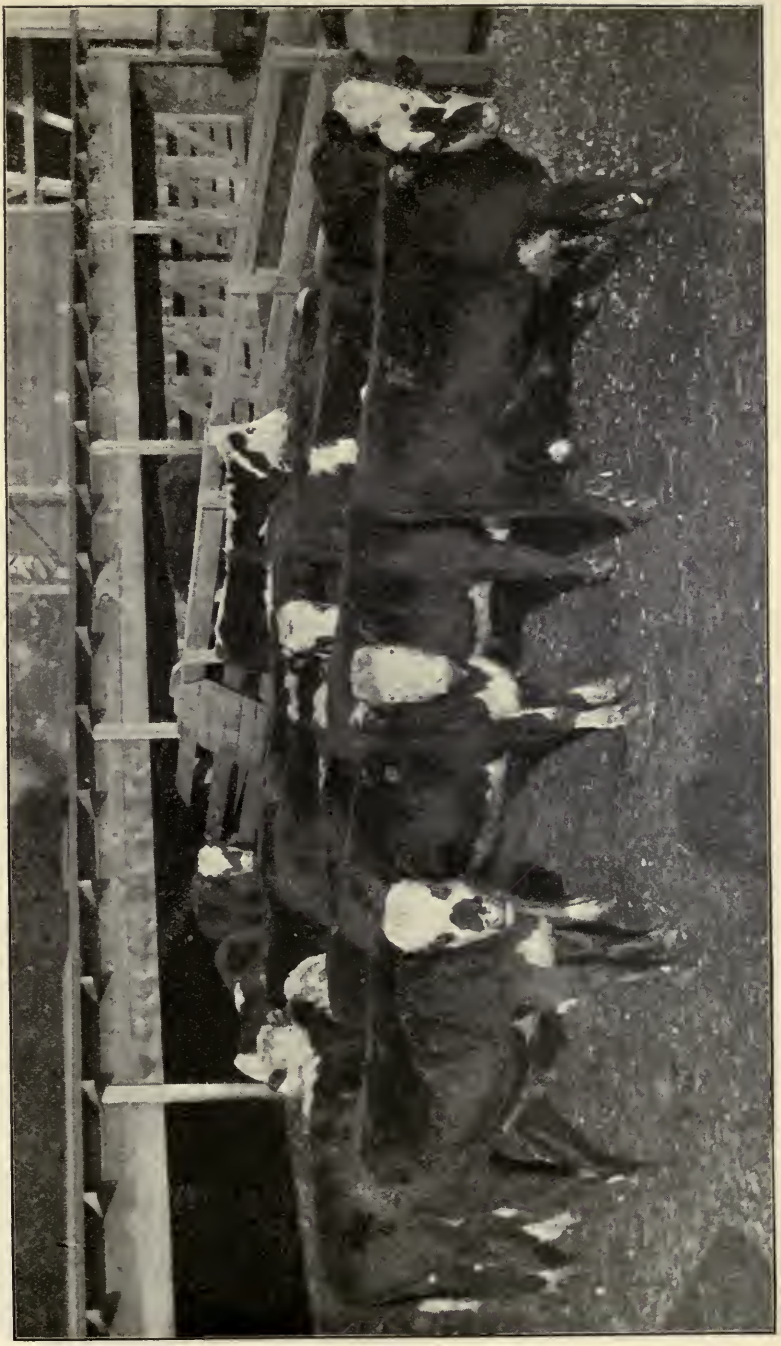

PLATE 1, LOT 1, FANCY SELECTED FEEDERS.

PLATE 2, LOT 1, AS MARKETED.

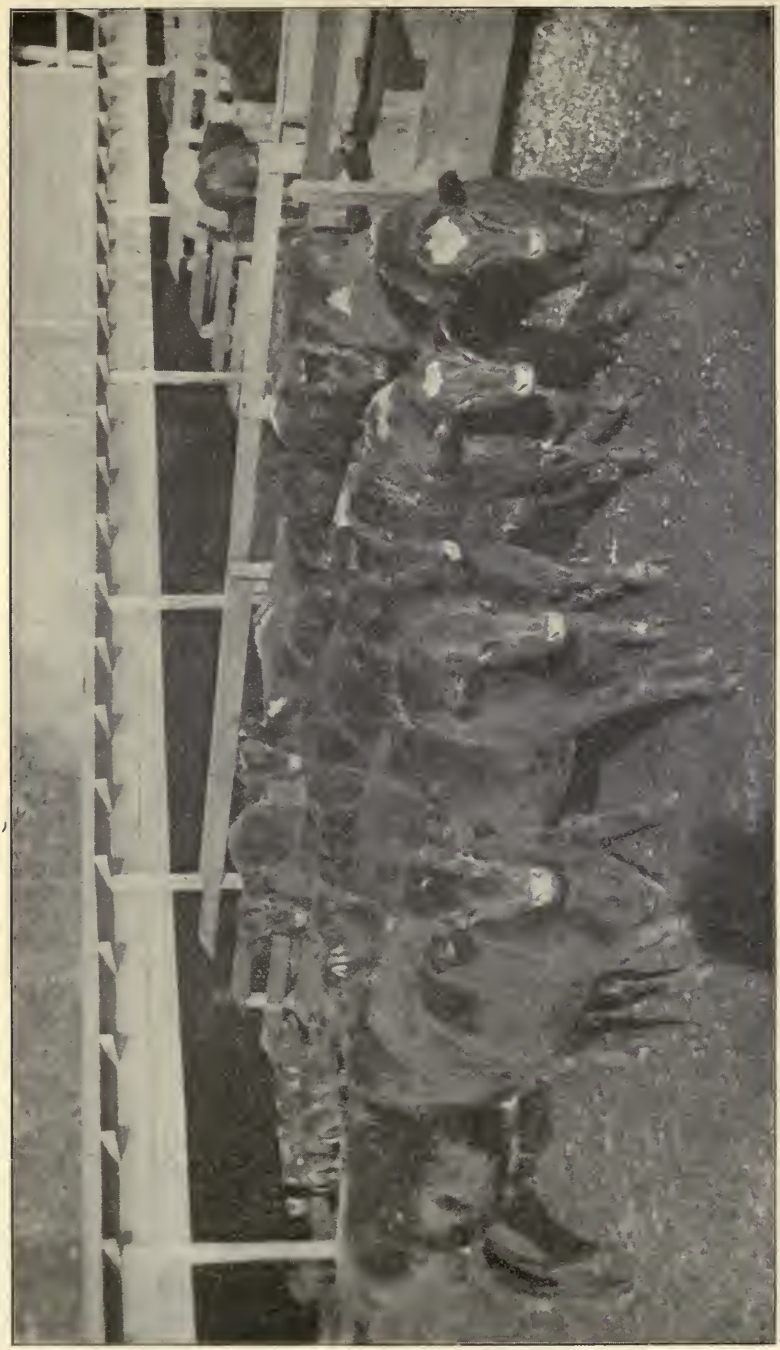

PLATE 3, LOT 2, CHOICE FEEDERS.

PLATE 4, LOT 2, AS MARKETED.

PLATE 5, LOT 3, GOOD FEEDERS.

PLATE 6, LOT 3, AS MARKETED.

PLATE 7, LOT 4, MEDIUM FEEDERS.

PLATE 8, LOT 4, AS MARKETED.

PLATE 9, LOT 5, COMMON FEEDERS.

PLATE 10, LOT 5, AS MARKETED.

PLATE 11, LOT 6, INFERIOR FEEDERS.

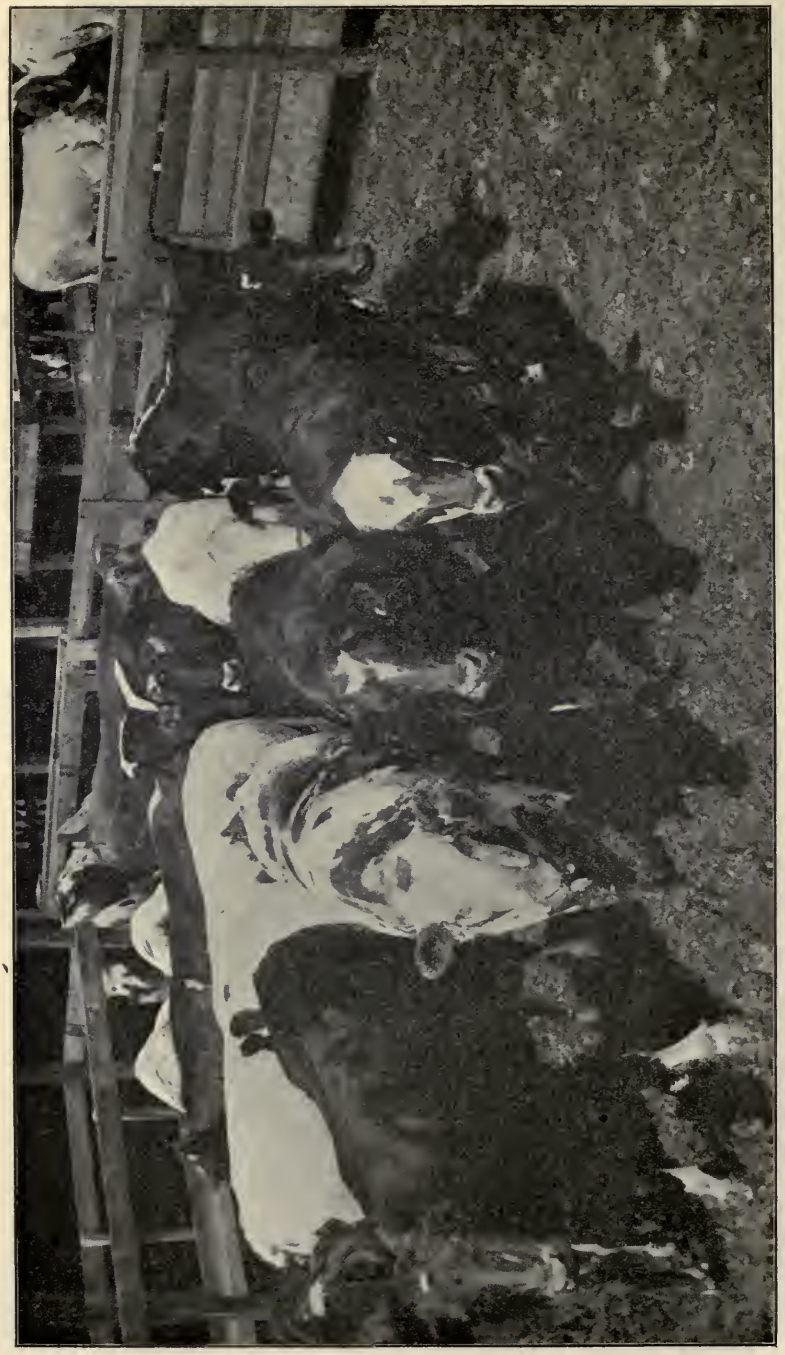

PLATE 12, LOT 6, AS MARKETED.

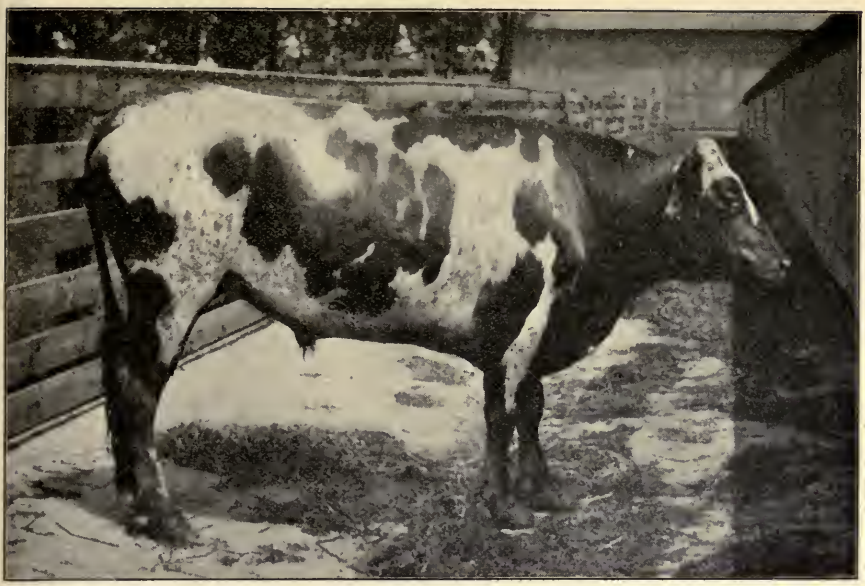

PLATE 13. THE INFERIOR FEEDER THAT GAINED BUT 80 POUNDS IN FOUR MONTHS, AS MARKETED.

PLATE 14. THE FANCY SELECTED FEEDER THAT GAINED NEARLY FOUR POUNDS A DAY FOR FOUR MONTHS. PHOTOGRAPH TAKEN A FEW DAYS BEFORE MARKETING.